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CONTENTS

PAGE

Officers and Council of the British Association 465

Notes 469

Education for Industry (Address to Section L, Educational Science), by Dr. A. P. M. Fleming, C.B.E. 471

Abstracts of Communications to Section L (Educational Science) 478

The Informative Content of Education (Report) 482

Research in Education (Report) 533

Science and Social Pioneering, by Dr. Isaiah Bowman 552

Index to The Advancement of Science, Nos. 1–4 568

NOTE ON COMMUNICATIONS TO THE SECTIONS

Dundee Meeting, August 30–September 1

When the Dundee Meeting was brought to a close after three days, it was decided that all communications of which the delivery was unavoidably cancelled should be taken as read. Abstracts (or titles) of communications are therefore printed in these pages whether the communications were delivered or not, and references to dates and hours, as furnished in the Journal issued at the Meeting, are excluded.

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THE ADVANCEMENT OF SCIENCE

NOTES

THE President and General Officers conveyed to Sir Buckston Browne, F.R.C.S., who presented Charles Darwin's home at Downe to the Association, their congratulations on the attainment of his ninetieth birthday, which fell on April 13 last. In his acknowledgment Sir Buckston Browne quoted : *Non cuivis homini contingit adire Corinthum.*

* * *

The Alexander Pedler Lecture was given by Prof. Allan Ferguson at Cardiff on March 14 last, in collaboration with the Cardiff Naturalists' Society. The subject was ' Splashes, and what they teach.'

* * *

George Radford Mather, who founded and endowed the Radford Mather Lecture in the Association in 1937, died on March 22 last, in his ninety-ninth year. He was born on October 17, 1841, at Irchester in Northamptonshire, and attended schools at Higham Ferrers and Northampton. At the first of them he acquired an early interest in physical science, which remained with him, through reading a life of Newton. After being apprenticed as an engineer and working for Allchin's firm in Northampton and J. & G. Rennie's in London, he established his own business in 1865 as a mechanical engineer and iron and brass founder in Wellingborough, retiring in 1909.

* * *

The Radford Mather Lecture is given, in accordance with the terms of the foundation, every three years. The first of the series was delivered by the Rt. Hon. J. Ramsay Macdonald, P.C., M.P., F.R.S., in London, on October 22, 1937, immediately before he left home for the voyage in the course of which

he died. The second lecture was given on May 20 last in Newcastle-upon-Tyne (where this year's annual meeting of the Association should have been held) by Prof. Sir Arthur Eddington, O.M., F.R.S., on 'The Story of the Nebulæ.' The lecture was arranged in collaboration with the Literary and Philosophical Society of Newcastle-upon-Tyne.

* * *

The Norman Lockyer Lecture, 1940, was appointed to be given by Prof. W. L. Bragg, F.R.S., on 'The Physics of Metals,' on June 24 at the University College, Hull, with the kind co-operation of the College authorities.

* * *

It was reluctantly decided, at the end of May, to cancel the Conference which had been appointed to take place at Reading on July 25–27. Arrangements were well advanced, and it is possible only to offer an expression of gratitude to all those who had helped to make them so.

At the moment when this note is written, it is not possible to forecast whether the next issue of THE ADVANCEMENT OF SCIENCE, due for publication on October 25, will appear at that date. Considerations of finance and the paper supply will have to be taken into account.

EDUCATION FOR INDUSTRY

ADDRESS TO SECTION L—EDUCATIONAL SCIENCE

By A. P. M. FLEMING, C.B.E., D.Eng., M.Sc.(Tech.)
PRESIDENT OF THE SECTION.

In presenting this address on Education for Industry, I would venture to call your attention to the part that the manufacturing industries play in our economic life. At a time when national security is a primary consideration, the significance of these industries is easily recognised. In more normal times, however, it may not be appreciated that on the state of industry directly or indirectly depends the material well-being of the entire population.

Many amenities which have profoundly affected our social and economic life, such as the widespread availability of electric power, rapid communication, accelerated transport facilities, etc., have been made possible only because the manufacturing industries have been able to turn new scientific knowledge to practical account.

The appropriate education and training of the personnel for such fundamentally important service is consequently a matter of national concern. To appreciate the requirements on which such education and training is to be based it is necessary to understand what industry really means.

The purpose of industry is to convert some natural resource into a form suitable for use by the community, as, for example, metallic ores which are transformed into innumerable appliances, the down of the cotton plant that eventually becomes clothing, the chemical energy of coal, or the kinetic energy of falling water, that is converted into electrical power. This transformation process, which we call industry, may, and usually does, include many stages, each one of which may constitute a separate industry, the finished product of one factory being the raw material of the next in the chain of operations between the original natural resource and the final manufactured product.

The fundamental need in this chain of processes is that each shall be accomplished with the minimum possible waste of human effort, materials and time, and it is evident that the problems involved in achieving this efficiency must be fully appreciated before the educational considerations affecting them can be planned and applied. To avoid any misconception of my meaning of this term efficiency, I wish to point out that the enlightened industrialist recognises that true efficiency depends upon every consideration being given to the well-being of the personnel in his organisation.

The transformation of natural resources involves the handling of a vast variety of different materials, each of which demands as a rule special knowledge and technique. For example, the manufacture of a modern electrical generator requires a variety of grades of steel each having some special physical

properties ; non-ferrous metals such as copper and a wide variety of alloys ; a miscellany of organic materials such as cotton, silk and linen fabrics, rubber and synthetic moulded products, varnishes, etc. ; and inorganic materials such as mica and asbestos.

Every new scientific discovery may have an important bearing on technical development, for it may suggest some new orientation of a process and thereby have far-reaching effects on the treatment and use of the materials involved in the manufacturing methods under consideration. Moreover, finality of form is never reached, due to the urge of engineers and research workers to effect improvements.

Apart from continual changes of a technical character, many developments have taken place in the organisation of industry, which present new educational needs. Industrial units have changed from privately-owned to limited liability companies. These in turn have grown in size, or become associated with other organisations in the same industry, or formed part of a co-ordinated chain of manufacturing concerns associated with the same ultimate product ; or again single or groups of companies making the same product have formed combinations to rationalise the distribution of output and to co-operate in eliminating manufacturing and other costs where overlapping occurs. Such combinations may be national or international in character. All these changes in organisation impose the need for personnel capable of filling a wide range of positions for each of which special training is needed.

Industrial conditions are thus never static, and therefore the personnel of industry must be ever alert to apply new knowledge wherever it affects their particular field of operation, and be fully adaptable to the changes in the processes of manufacture and organisation which result.

Preoccupied as he is with the technical, economic and administrative problems associated with continuous, and often very rapid, development, the industrialist is apt to overlook the need for constant attention to the educational reactions of this development, and of his associated responsibilities. On the other hand, and to an equal extent, those concerned with technical education especially may suffer from an unbalanced view as to the value of such education relative to all the other problems which face the industrialist. The difficulty of co-ordinating these two points of view is often responsible for an excessive ' time-lag ' between the incidence of a new technique in industry and the preparation of a personnel capable of handling and utilising it effectively.

From the foregoing it will be appreciated that the evolution of industry involves a continual change in the character of the knowledge that must be applied by those engaged in it, if they are to achieve a continually increasing efficiency of production. How important this question of efficiency is to the whole community of an industrial nation may not always be appreciated. The material progress of civilisation demands an increasing supply of manufactured products of all kinds. Whether these products are manufactured at home or bought from abroad depends logically on where the production can be achieved most cheaply. If they are manufactured at home, employment is increased and money is available for circulation. This affects eventually all the community and not merely those workers directly engaged in industry. It is therefore of vital importance that the transformation we speak of as industry shall be conducted with the utmost efficiency, and to achieve this the

personnel engaged in it must be most effectively trained ; which in its broadest sense means most effectively educated.

Industrial personnel can be divided into two main groups : manual and non-manual workers. The first requirement of the manual worker is practical handicraft skill, and of the non-manual worker specialised knowledge applicable to the function he fulfils in the particular branch of industry concerned. To satisfy these requirements well-organised schemes of theoretical and practical training must be made available to all those fitted to take full advantage of them.

There are four main classes of entrants into industry, namely, those who enter at the school-leaving age from Elementary, Junior Technical, Central and Secondary Schools ; those from Secondary Schools who have attained School Certificate or Higher School Certificate standard ; those who have had University training ; and those adults who enter at any age and from any educational level. Of the first three classes, the University group contains the smallest proportion of misfits. At the lowest entry level economic need and local conditions of employment may, and usually do, determine the choice of vocation. In addition there is still considerable social prejudice in favour of the so-called ' black-coated ' occupations. The importance of vocational guidance in the early years cannot be too highly stressed, and although good work is being done in this direction much more is needed ; it should in fact be accepted as a responsibility by every competent teacher. Such acceptance implies, of course, familiarity with local conditions and opportunities. One useful adjunct might be the keeping, from school entry age onwards, of a record of the particular characteristics, aptitudes and preferences displayed by the pupil. Such a record would be of considerable value at the time when discrimination is made between Secondary, Junior Technical and Junior Commercial Schools. For those entering industry at the lowest stage there is, at present, little conscious preparation for industry from the educational point of view other than that in the Junior Technical Schools. The practical industrial bias given in these schools, for at least the two final years, is of definite advantage. Whether the selection of those proceeding to the Junior Technical School could be improved is open to question, but there is certainly no doubt of the advantage of this period of education to those who do follow it. A much greater proportion of Junior Technical School pupils who enter industry advance rapidly than is the case with their fellows not so educated. Indeed the tendency is for many of them to be recruited to the ranks of foremen, junior managers, draughtsmen and so on, with the result that the equally important field of artisanship is not very well fed numerically from this source. Records of one factory, compiled over a period of years, show that whereas 64 per cent. of the entrants from Elementary Schools became artisans, less than 10 per cent. of the entrants from Junior Technical Schools did so, in the same period.

The type of industrial training required for the manual worker who aspires to learn a trade or acquire a craft consists of a long period of practical experience with the tools, materials and processes of his chosen trade or craft and accompanying classroom education which may be secured by evening study in a

local part-time institution, by part-time day training, or in a works' school during working hours. The character of these studies varies considerably, but it is becoming increasingly desirable that they should lead to National Certificates as a course of this type provides sufficient basic technical knowledge. Moreover it provides a good basis for further study for the youth who is worthy of promotion.

For those youths who do not aspire to technical employment and whose natural bent is of a more practical character, the Workshop Courses provide an admirable adjunct to their practical experience.

Those who enter industry at the School Certificate or Higher School Certificate level have usually had the advantage of a preliminary science preparation which facilitates their acquisition of industrial process experience. Moreover their higher general educational level makes it possible for them to attain staff positions where their more maturely developed powers of judgment and their social attributes are of advantage.

Those who enter after University training have already acquired a considerable amount of knowledge of the technological and fundamental principles required in the particular branch of industry they select. A high degree of specialisation at this stage is extremely undesirable. It is of far greater value to be well versed in the fundamental principles of the selected and associated subjects. Indeed the latest tendency in industry is for any specialised training that may be required to be provided by the concern itself a year or two after entry. For example, in the Company with which I am associated there are several specialist training schemes in operation. The recruits for these schemes are, in the main, drawn from those University graduates who have acquired general experience in the factory for a period of one or two years. Such arrangements may, of course, be usefully supplemented by advanced courses of lectures where these are available at the local University or Technical College. One or two examples of such courses may be of interest. Design and development activities in engineering demand a continual influx of men who have received a considerable amount of technical and practical experience and are then prepared for specialist and advanced work. This preparation may take the form of special guidance in study and design work under a leading design engineer, together with lecture courses in the scientific developments allied to the particular subjects selected. Such courses apply in connection with the development of prime movers, generators, power transmission plant and power-absorbing devices, illumination and communication.

Much attention is now being devoted to the problem of finding suitable personnel trained to undertake the increasingly difficult problems of management. This is a matter of vital importance in ensuring continuity of progress in manufacturing concerns. It is essential that the selected men should be given preliminary and widely-applied responsibility before making use of such aids as the ancillary instruction now available in many technical institutions. A wise management recognises that giving promising young men a wide range of experience will bring out their latent capacity for administrative responsibility.

Recruitment for research work in industry is another case where the selection of personnel inherently suited for such work must be the basic factor. Methods of training research workers are beginning to evolve, but so far no

recognised plan is established. In my own laboratories general apprenticeship in the factory is followed by experience in several of the laboratories under the guidance of experienced research workers, supplemented by lectures on the work in their own and associated fields by senior members of the department. In some cases such workers are sent back to a University or other research laboratory for further experience.

There is a natural tendency to concentrate attention on those engaged in some form of handicraft skill or technical operations for which particular education and training are required. It must not be overlooked, however, that there are vast numbers of young men and women engaged in clerical and other branches of employment in industry. For the most part, however, their education and training can be adequately satisfied by the existing facilities.

The normal trend of industry and its corresponding educational requirements can to some extent be forecast, though contingencies arising from an abnormal international political situation may disturb this.

New scientific knowledge with its technical application is likely to continue to be a determining factor in industrial development. Continual improvement in efficiency of production tends to reduce the amount of labour required and to that extent accentuates the unemployment problem. On the other hand, out of scientific discoveries new products, processes and materials arise, and these, through the formation of new industries, contribute towards redressing the balance of employment. The film and the radio industries may be cited as examples of large-scale employment brought about by the technical application of scientific discovery. Such developments, however, emphasise the need for mobility and adaptability on the part of the personnel employed, because new industrial activities demand modifications to established handicraft technique as well as to the planning and organisation of production.

It is apparent that the mechanisation of processes, more particularly where repetitive work is involved, will become more extensive, and this should ultimately result in the securing of the necessary volume of production in shorter working periods—especially if employment could be more evenly distributed. Some of the time then available for additional leisure might be well employed in education of a cultural and social character and in physical training. By suitable planning it should be possible to reduce and eventually to eliminate the system of part-time evening study. The deficiencies of this system of technical education for those engaged in industry are well understood, but whether technical study is conducted in part-time day or part-time evening periods, the practice of compressing a large amount of highly specialised knowledge into intensive courses should be avoided. While appreciating the present usefulness of courses such as those leading to the Higher National Certificate, particularly to those young people who have no other means of acquiring the basis on which to proceed to technical employment, such courses should, in a planned educational system, be considered as expedients only. They provide neither the time for original, critical, or constructive thought, nor the means of developing latent personal qualities by any form of social and corporate life, and above all it is important to encourage educational methods which develop ability to think independently rather than simply to

add to a store of knowledge. That so many young people succeed by the existing methods is a tribute to the individual rather than to the system.

Certain industrial activities, notably those associated with supplies such as water, gas and electricity, are easily recognisable as public services. As time goes on there will be a growing realisation that every industry is in fact a national service, although it may be conducted, as at present, by private enterprise. Considered in this light the importance of employing every means of increasing the efficiency of industry becomes apparent. Among other considerations, it is obviously essential to utilise all the facilities available for the training in numbers and in quality of its personnel. The conventional system of education is subject to control by national and local educational authorities, but there is no control over the equally important practical side of education for the industrial worker. No national means exist whereby a standard can be set for this phase of education, nor in fact are the resources for training in industry fully utilised. The *laissez faire* methods whereby the quality and extent of practical education of industrial personnel depends on a relatively few progressive industrial concerns compare unfavourably with the planned and more efficient methods that are possible in authoritarian countries. Under present conditions this weakness can be remedied only by more complete voluntary co-operation within industry. Such co-operative effort would relieve the burden that now falls upon a few individual firms. An effective way of stimulating this might be the remission of income tax on the money expended on such training. Control could be instituted by restricting the remission to courses approved by a suitably constituted authority.

The establishment in industrial firms of separate ' nursery ' workshops in which the fundamentals of handicraft skill and machine operations are taught concurrently with the appropriate workshop instruction will become more widespread. A few schemes of this type are already in operation in private firms and in a number of Government establishments in this country, while the method has been extensively developed in Germany and to a lesser extent in other countries. Experience will show at what stage the trainee should be transferred from the ' nursery ' workshop to the normal manufacturing conditions.

The result of introducing manual training at an early age such as exists in the educational system in Russia will be watched with great interest.

In contrast to this, with the raising of the school-leaving age, the tendency in this country will be for young people to enter industry for practical training at progressively increasing ages. This may involve a more intensive period of practical training, but the difficulties of this should be offset by the greater maturity of the trainees concerned, which the longer period of general education will ensure.

An educational problem that is already acute and will be even more so in the future is the supply of suitable teaching staff for the Universities and Technical Institutions. Formerly much of the scientific and technical development relating to industry came from the Universities. Due largely to the establishment of large-scale research by industrial concerns and to the great expansion of their technical staffs the initiative in progress has passed to industry, and many scientists who previously found their vocations in academic life are now attracted to scientific and technical employment in industry.

The result is that in those faculties in which the work has a technological bearing there is a great shortage of personnel available for teaching, so that the time is opportune for the Technical Institutions and Universities to consider a long-term policy as regards selecting and training those who will eventually become the academic leaders. The practical industrial side of this training is of paramount importance. In this connection co-operation should be arranged with industry to provide a suitable range of practical experience without the permanent absorption of the personnel so trained. Industry has already shown its willingness to co-operate with education in this respect by providing short ' refresher ' courses for those in academic employment who have little opportunity of maintaining close contact with industrial developments. The technical knowledge and experience of eminent technologists in industry might well be utilised more completely than at present by co-opting such men to the professorial staffs of Universities and Technical Colleges, and thus augmenting, for special courses, the existing teaching facilities. New technical processes now arise so rapidly from scientific discoveries and become so promptly established in industry that the text-books used for teaching purposes can never be completely up to date. The introduction of Post-Advanced Courses in the Lancashire area appears to be the correct solution to this problem. These courses, which comprise short series of lectures on specific technical subjects, are given mostly by experts in industry and are conducted on a basis of exposition and discussion. They serve admirably the needs of the technologist in industry who is endeavouring to bring himself up to date in a new subject.

The greater availability of technical scholarships and fellowships might well serve as a means of attracting suitable personnel to industrial employment. The extension of fellowship facilities available for those who seek experience abroad is extremely valuable, particularly if these are awarded to men who have already had sufficient experience to know definitely in what particular directions they wish to supplement their existing knowledge. In the past many educational opportunities of this type have not been used to the best advantage due to the immaturity of those receiving the awards, who have not had sufficient experience to appreciate fully that educational and industrial methods can never be transferred wholly from one country to another because social and economic conditions differ. Some industrial organisations have established Research Fellowships, whereby University staffs can spend time in industrial research organisations, which provides experience of inestimable value to the fellowship holder on his return to academic life.

As yet there is no clearly defined and assured path by which a youth can proceed through the various stages of education into industrial employment. The national system of education provides the means whereby those of suitable ability can obtain education and training up to and including the University or Technical College level, but the practical training in industry and an assured start in a job is at present fortuitous. In this direction there is room for greater co-operation by industry to ensure the completion of the industrial training and a start in the chosen career. Such an arrangement would give direction and impetus to the various stages of preparation between school or college and industry, would cut down some of the time spent in obtaining what may be

unnecessarily detailed technical knowledge, and moreover would relieve both the youth and his parents of a good deal of anxiety.

Greater co-operation than at present exists between education and industry is essential in regard to the syllabuses of workshop and technical studies appropriate to the educational level at which entrance into industry is made. Equally also co-operation is needed to ensure the adequacy and up-to-date-ness of the laboratory and workshop equipment of the Technical Institutions and Universities.

Any attempt to improve our methods of education has an immediate and obvious advantage from the industrial point of view. All education should be liberal and even to meet the urgent needs of industry no technical specialisation should be permitted which excludes the possibility of time being devoted to broadening the mind in both the mental and the social sense. Men and women who have been trained to think for themselves, rather than merely to assimilate facts, are bound to develop valuable habits of constructive criticism and be the more ready to utilise and develop new ideas. Since science plays an ever-increasing part in the development and progress of new products of industry, a knowledge of scientific principles and of their economic significance is essential to the proper utilisation and appreciation of these products. Consequently it is highly desirable that elementary science should have a definite place in general education.

In this address I have purposely stressed the technical aspects of education for industry, since these to a considerable degree serve also as a basis for the industrial education of the personnel in those branches of industry not directly of a technical character. In so doing I am acutely conscious of the risk that, speaking as an industrialist, I may convey the impression that industry is concerned with the education of its personnel in a narrow sense only. This is far from being the case. I cannot too strongly emphasise the need for the education of those engaged in industry to be characterised by broad aims and to be linked up with the world outside.

SECTION L.—EDUCATIONAL SCIENCE

COMMUNICATIONS

Discussion on Education as a preparation for industry.

Mr. W. O. Lester Smith.

The importance of a sound general education and the significance of Hadow reorganisation. The entry to industry, choice of employment ; our educational neglect of the adolescent and the consequent wastage of human material. The Fisher Act and the Day Continuation School. The Spens Report and the post-primary curriculum. The organisation of technical education ; regional co-operation. The necessity for a constant revision of the subject-matter of technical education in order to meet the needs of a competitive and scientific age. Facilities for the training of technical teachers, for transmitting knowledge of new processes, and for circulating the achievements of research.

Dr. K. Fisher.

Mr. B. Mouat Jones.

Discussion, led by Dr. J. A. Bowie.

* * *

Discussion on Education in industry.

Industrial concerns.

Mr. J. B. Longmuir.

Educationists, in giving nearly all children the kind of course which leads to a university, have neglected the many. The raising of the school-leaving age is a splendid opportunity to make amends.

Commencing with a summary of the educational requirements for those in industry, the extent to which these are being met are described.

It is claimed that the educational requirements of industry are just as necessary for the full enjoyment of the leisure hours as for the full enjoyment of the working hours of the future citizen.

Employers' obligations for the technical education of young workers, the limitations of works schools, evening continuation classes and the possibility of introducing day continuation classes are discussed.

Mr. G. L. Darbyshire.

Range of employment represented by London Midland and Scottish Railway.

Methods of recruitment and qualifications for engagement.

Training arrangements, with particular reference to commercial and operating and engineering departments.

Internal education—Classes for instruction in : Goods and passenger station office work ; Block signalling ; Locomotive working ; Permanent way maintenance ; Signal and telegraph maintenance ; Lectures on special problems.

External education : Arrangements with Educational Authorities ; Encouragement for staff in further education.

Films for instructional purposes ; Departmental publications as instruments of staff education.

First-aid classes and safety-first instruction.

School of Transport, Derby.

Part-time education outside the works.

F. T. Chapman.

Those in industry for whom technical education is needed can be considered in three groups :

(*a*) Craftsmen ; (*b*) Technologists ; (*c*) Managers and administrators.

In each case the training presents three aspects :

(*a*) Learning of techniques ; (*b*) Acquisition of skill ; (*c*) Study of technology.

The outstanding problems are concerned with (*a*) the apportionment of the training required between systematic instruction in schools on the one hand, and practical experience on the other, and (*b*) the best methods of co-operation between industry and educational institutions.

Principal J. Cameron Smail, O.B.E.

Technical education in Britain has been built up largely on part-time education mainly in evening classes. The results have undoubtedly justified the scheme, but the strain on individuals is considerable. Day classes have been suggested and urged for many years, and have been in operation in dockyard schools and various works schools and in particular industries such as printing, but no joint national scheme operates. The outstanding results of the dockyard scheme show the

possibilities for educated students. The personnel for control, organisation, administration and design has been largely recruited through part-time education. The psychological value of the ' sandwich ' system is insufficiently appreciated and further investigation is desirable.

Colleges are confronted with difficulties in staffing and equipment, the varying degrees of sympathy and indifference of employers and the consequent variation in the attitude of students. Advances by industries are clearly indicated and the shortage of well-educated young people, owing to various causes, is likely to force the matter to a definite issue in the near future.

Post-Advanced work.

Prof. Willis Jackson.

It is now widely accepted by industrial concerns that the primary function of University courses in applied science is not to provide them with ready-made specialists, but rather to develop the ability to think deeply and critically in terms of those fundamental principles which underlie all the specialised branches of a particular applied science. With this growing recognition has come the recent development in local areas of post-graduate courses of instruction—termed Post-Advanced Courses, since they serve the needs also of those men who have proceeded through part-time evening courses to Higher National Certificates—of a specialised technological character appropriate to the industrial needs of these areas. The paper outlines the nature of some of these recently organised courses and discusses the educational principles involved.

Discussion, led by Mr. C. A. Oakley.

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Discussion on Aspects of industrial research.

Mr. T. M. Herbert.

This paper discusses the functions of an industrial research department, with special reference to its introduction into an established industry such as a railway. A description is given of the gradual development of the L.M.S. Research Department, and of certain problems inevitably encountered in the early stages of its growth. The ultimate effects of an active research department within an industrial undertaking are analysed.

Examples of the type of work undertaken are given in the paper, which is illustrated by a film of a semi-popular character.

Dr. W. G. Radley.

During the past twenty years there have been very great developments in the facilities extended to the public for inter-communication by telephone, telegraph and radio. The telecommunications systems which provide these facilities incorporate complex equipments and devices which are the results of very recent research in physics. The Post Office system is maintained by an engineering staff of 45,000. The theoretical and technical training of this staff is therefore an important problem and the paper indicates the means that have been taken for its solution. The paper also describes the means that are taken for the training of supervisory staff who may be responsible for research and future development.

* * *

Discussion on Recent educational research in Scotland.

Prof. W. McClelland.

The paper deals with certain special investigations conducted under the Scottish Council for Research in Education, including studies of the prognostic value of

University entrance examinations and of methods of selection for secondary education.

Mr. W. A. F. Hepburn.

* * *

Discussion on The Spens Report.

Miss L. Grier.

The Report considers the relations between the education of children leaving school at sixteen and (*a*) those leaving at some later age ; (*b*) those leaving at some earlier age.

The last question simplified by the proposal to raise the school-leaving age to sixteen and complicated by the reaffirmation and the recommendation that all education after eleven should be Secondary. Variety to be maintained by schools with different objectives and under different management. Numerous suggestions made for lessening the domination of Universities, of examinations and of subjects.

Mr. J. B. Frizell.

(1) Differences between educational systems of England and Scotland making for difficulties in assessing the report from the viewpoint of Scottish educational administration.

(2) The leading conceptions of the report : (*a*) reform of secondary education ; and (*b*) developments in technical education.

(3) Barriers to achievement of the Committee's purpose and recommendations for their removal.

(4) Report in general corroborative of educational thought and practice in Scotland : its bearing on Scottish educational administration.

(5) Ways in which the report may influence educational administration in that country, particularly (*a*) Curricula ; (*b*) School Certificates ; (*c*) Technical Education ; and (*d*) School Organisation.

Mr. A. E. Henshall.

Limitations imposed by Committee's terms of reference. Wider survey occasioned far-reaching recommendations by the Committee in regard to organisation and administration of the system of secondary education.

Interests to be considered when the curriculum of secondary schools is discussed. Conditions to be fulfilled by the content of the curriculum ; suggested outline of a curriculum to satisfy these conditions. Safeguards necessary, if facilities for University education are to be provided and narrow specialisation is to be avoided. The Technical High School, its function and place in the secondary system. The content of general education.

Discussion, led by Mr. D. E. Collier.

THE INFORMATIVE CONTENT OF EDUCATION

SECOND REPORT of the COMMITTEE appointed to consider and report on the gaps in the informative content of education, with special reference to the curricula of schools (Sir RICHARD GREGORY, F.R.S., Chairman; Mr. G. DUNKERLEY, Vice-Chairman; Mr. A. E. HENSHALL, Secretary; Prof. C. W. ATTLEE, Miss L. HIGSON, Mr. A. GRAY JONES, Mr. D. SHILLAN, Dr. F. SPENCER, Mr. H. G. WELLS).

INTRODUCTION.

AT the conclusion of the Report presented last year a summary was presented of the results of a questionnaire, by means of which an attempt had been made to discover what measure of correspondence existed between the actual curricula of schools and the *Informative Content of Education* as outlined by Mr. H. G. Wells in his Presidential Address, Section L (Education) at the Nottingham Meeting of the British Association for the Advancement of Science. Therein it was stated that there appeared to be a consensus of opinion 'that the informative content of education outlined by Mr. Wells is both too wide in scope to be covered during the present school life of the great majority of children of this country, and too advanced in its demands upon the capacity of the pupils for whom the various sections of the subjects were suggested.' Attention was, however, directed to the differences of opinion revealed by the answers to the questionnaire, especially in regard to the sections which could and should be included in the curriculum; and it was noted that what some correspondents thought could not be taken with pupils of a given age-group, or could not be included within the scope of a reasonable curriculum, was actually being taken by schools for pupils of the given ages.

Reference was also made to another reason which might account for the fact that the replies to the Committee's questionnaire were not wholly satisfactory. It was pointed out that the phraseology used by Mr. Wells, necessarily adapted to the audience to whom it was delivered, was not likely to be appropriate for use in schemes of work for schools. This fact was obvious when the terms used in the suggested scheme for infants were examined. To speak of 'Elementary human cultures and their development in time,' 'States of Matter,' 'Biology,' 'Zoology,' 'Botany,' and 'Physiology' for children of seven years of age is to arouse suspicion if not antagonism; and to expect children of this age to have knowledge of any of these was thought unreasonable. Yet the opinion was expressed to the Committee that much of the actual information which Mr. Wells suggested should be taught, if not all of it, might be acquired by children by the time they reach the age of seven years, either through the stories told to them and the books they read or through the medium of Nature talks, observation records, gardening and such normal activities, all of which are part of the ordinary work of nearly every infants' school in the country.

INFANTS' SCHOOLS.

In the pursuit of their enquiry, therefore, the Committee decided to take steps to test the soundness of this opinion. With this object in view they endeavoured to discover how far the information referred to in the part of Mr. Wells' scheme for children of seven years of age was gained by such pupils. Accordingly, questions which covered the whole of the sections of the work were prepared and the assistance of head teachers of infants' schools, willing to conduct the enquiry, obtained. In addition, the co-operation was sought of head teachers of junior schools, where the local conditions of transfer of pupils resulted in children of the age of seven being in

their charge. Obviously it would have been impossible with the limited machinery at the disposal of the Committee to conduct a comprehensive investigation throughout the country. Nor was this necessary for the purpose of obtaining evidence that the scope of the work Mr. Wells proposed was within the comprehension of children of the given age and that the information was, in fact, actually acquired by some of the children. Typical schools were therefore chosen, and as these were situated as widely apart as Sunderland and Rhondda, Sheffield and London, the results may be accepted as illustrative of what will be found in the State schools.

Results of a Test.

The following table gives the questions together with the percentage of accurate replies for each of five different schools. Those given for A, B, C and D are the results in classes where the pupils are actually seven and not over eight years of age. Those for E are for an ' A ' class (that is, the brightest children) in an infants' school ; these pupils were only six years of age.

	School				
Number of pupils	A 55	B 36	C 25	D 116	E 36
I. *Human Cultures and their Development in Time.*	%	%	%	%	%
(1) What name is given to the place where you live with your father and mother ?	100	67	100	75	60
(2) In other lands there are other kinds of houses. What kinds have you heard of ?	100	59	70	55	50
What people live in snow houses ?	100	59	50	90	78
What people live in caves ?	80	28	10	6	—
What people live in tents ?	100	84	60	60	65
What people live in huts ?	50	28	50	8	35
(3) What men of whom you have heard					
(*a*) lived in a cave ?	25	84	30	7	14
(*b*) lived in a tent ?	30	56	15	41	20
(*c*) lived in a hut ?	2	50	5	20	—
(4) How did the men who lived in caves obtain their food ?	90	61	50	50	50
What did they use to catch animals ?	60	64	35	9	60
What did they use to catch fish ?	30	20	15	64	45
What else did these men obtain from animals ?	50	70	40	95	63
What people use furs for clothing ?	60	78	45	40	70
Who use sheep skins for clothing ?	30	84	10	25	—
What other use is made of skins ?	90	47	40	26	—
Who were the enemies of men who lived in caves ?	100	61	35	45	66
What did they do to be safe from wild animals ?	100	33	20	30	48
(5) Later, men found an easier way to obtain food. What did they do to be sure of animal food ?	—	36	—	8	—
What did they do to be sure of food from plants ?	10	47	5	8	3
(6) When they had tame animals what did they have to do to obtain food for them ?	5	44	10	10	16
(7) When they moved from place to place how did they provide shelter for themselves ?	25	70	10	22	30
(8) How did they get coverings for their tents ?	50	64	40	56	70
(9) When people began to grow food plants what was it necessary for them to do ?	2	14	5	27	3
(10) If they had to stay in a place for a longer time what difference would that make to their shelters (or tents) ?	10	28	10	34	3
(11) How would they make them stronger ?	25	28	15	16	3

	School				
Number of pupils	A 55	B 36	C 25	D 116	E 36
	%	%	%	%	%
(12) When twigs were used to fill in spaces between wooden uprights what would have to be done to keep out the rain?	10	36	10	35	66
Where can such mud huts be seen to-day?	2	22	10	7	70
(13) When people lived in tents and huts how did they get the things which they could neither obtain from animals nor from plants?	25	25	—	2	—
(14) With whom might they exchange them?	50	8	15	12	8
(15) Later they exchanged goods with people who lived in other districts.					
How did they take the goods?	80	28	20	20	—
What name is given to animals which carry goods?	—	42	—	75	—
What 'Beast of Burden' have you seen in this country?	80	64	50	20	60
Of what other beasts of burden have you heard?	90	56	50	—	70
Where is the camel used?	90	53	45	72	68
Where is the dog used to draw carriages?	75	70	30	60	70
If the people had to cross water what would they need?	100	92	65	61	80
(16) When some people had many cattle and others had none what would those who had none try to do?	25	47	35	35	—
What might this lead to?	40	50	35	60	11
If they fought what would the victors be likely to do?	2	14	40	60	6
II. *States of Matter.*					
(1) If water is in a jug and you wish to put some of it into a glass what do you do?	100	81	90	75	65
(2) What else can you pour from a jug into a cup or a glass?	100	92	100	86	72
(3) What name can be given to water, milk, beer and tea?	2	8	30	40	6
(4) If a stone were in a jug and you tried to pour it into the glass what would happen?	30	64	100	76	70
(5) Why can't you pour a stone into a cup?	10	75	45	20	50
(6) Name anything else besides a stone that cannot change its shape and that cannot run from one vessel to another.	60	97	80	27	—
(7) What name is given to stones, iron, wood, etc.?	—	6	35	6	14
(8) When water is placed in a kettle and heated what happens?	100	47	80	64	28
(9) If allowed to continue to boil what becomes of the water?	60	64	60	28	68
(10) If during winter water is left in a bowl outside the house what sometimes happens to it?	100	78	55	55	53
(11) What is the difference between water and ice?	20	72	25	28	65
(12) What three forms can water be made to take?	50	59	45	10	10
III. *Geography.*					
(1) What can be seen in the sky during the day?	100	78	95	65	60
(2) Where does the sun rise?	100	56	40	85	14
(3) When is it highest in the sky?	100	64	40	42	78
(4) What does the sun do before night?	75	56	60	55	8
(5) When you face the sun what can be seen behind you?	100	78	50	60	66
(6) At what time in the day does your shadow point to the west?	14	11	15	30	11
to the north?		42	25	60	60
to the east?		6	20	46	—
(7) What sometimes hides the sun?	25	86	65	95	90

	School				
Number of pupils	A 55	B 36	C 25	D 116	E 36
	%	%	%	%	%
(8) What different kinds of clouds have you seen?	100	50	35	20	70
(9) What do dark, heavy clouds bring?	100	89	75	78	73
(10) What causes the clouds to move across the sky?	50	47	35	37	67
(11) What is wind?	100	6	20	7	16
(12) Which wind brings rain?	70	70	45	18	—
(13) Which wind brings snow?	100	75	50	47	22
(14) Which wind is a warm wind?	4	64	15	40	—
(15) Which is a stinging wind?	100	11	50	63	56
(16) What is the name of the nearest river or stream?	70	64	15	68	28
(17) Where does the river flow to?	2	47	53	20	33
(18) How do men cross seas?	80	92	100	80	33
(19) When do people go to the seaside?	80	97	75	82	78
(20) What other places do people go to for holidays?	50	53	85	82	60
(21) What is the nearest mountain or hill to your school? Between hills or mountains there is often a stream.	—	86	10	22	11
(22) What name is given to this land between hills?	20	78	35	26	60
(23) Why did men make railways through the valleys?	5	11	20	23	50
(24) What do all the seas and land make up?	20	50	15	17	35
(25) What is the earth sometimes called?	100	3	50	17	25
(26) What shape is the world?	10	78	55	70	—
IV. *Biology.*					
(1) What animals do we have in our homes?	100	95	100	100	70
(2) What kind of animals are the cat and dog?	75	50	50	60	72
(3) What other animals are like the cat?	70	47	35	24	—
(4) Where are tigers found?	60	81	45	30	35
(5) What other animals are like the dog?	60	33	25	20	53
(6) Where is the wolf found?	30	50	15	2	25
(7) What animal is most like a man?	90	28	25	27	—
(8) Where are apes found?	20	50	30	43	42
(9) What other animals are found in forests?	50	44	50	40	45
(10) Which of these are found in warm countries?	100	50	40	57	53
(11) Which of these are found in cold countries?	80	84	65	63	67
(12) What animal does man use to work for him?	80	84	90	70	78
(13) What other animal is like the horse?	8	20	75	65	80
(14) Where is the zebra found?	5	89	30	10	56
(15) What animals provide food for man?	60	75	100	75	28
(16) Where are sheep found?	30	75	95	40	67
(17) What do men get from goats?	75	53	30	68	60
(18) Where are wild goats found?	—	11	10	38	50
V. *Descriptive Zoology and Botany.*					
(1) What do wild animals eat?	5	42	45	10	—
(2) Which of them eat plants?	5	95	30	18	33
(3) What plants do men eat?	100	92	100	67	33
(4) Sometimes the roots are eaten. Which foods are roots?	60	67	55	38	50
(5) Which plants give fruits that can be eaten?	100	92	100	70	11
(6) What happens to apples and pears allowed to remain on the trees when they are ripe?	2	64	50	40	23
(7) What birds peck them?	2	44	45	24	3
(8) What other creatures sometimes eat apples and pears and plums?	10	42	15	18	60

	School.				
Number of pupils	A 55	B 36	C 25	D 116	E 36
	%	%	%	%	%
(9) Where do wasps live?	2	11	5	10	45
(10) What creature besides the wasp has a sting?	80	95	90	60	—
(11) Why do bees visit flowers?	50	81	75	80	53
(12) How do bees help the plants?	10	39	65	6	80
(13) Where are the seeds of apples found?	60	86	100	30	—
(14) Where are the seeds of flowers found?	10	33	80	60	60
(15) How are seeds scattered?	10	89	50	40	67
(16) What animals help to scatter some seeds?	5	20	20	34	47
VI. *Elementary Physiology.*					
(1) If you wish to grow a pea plant what do you do with the seed?	10	95	80	75	67
(2) Why is it placed in the ground?	5	70	50	20	70
(3) If it were placed in dry sand what would happen?	50	42	40	56	60
(4) What must the seed have then?	60	89	75	80	56
(5) Which part of the plant begins to grow first?	5	53	55	60	60
(6) If the plant is kept in a dark cupboard what kind of growth does it make?	2	14	60	20	50
(7) What must plants have to grow into strong, healthy plants?	60	50	50	50	50
(8) What would happen if animals were kept without water?	75	81	100	67	67
(9) What would happen if animals were kept without sunlight?	2	78	80	20	6
(10) What would happen if animals were kept without air?	75	92	100	50	53
(11) What can animals do that plants cannot do?	80	42	45	63	15
(12) If animals are not allowed to move about, what difference does it make to them?	60	22	35	20	16
(13) What must animals have besides water, light, air and food?	5	20	30	24	14
(14) What creatures sleep in the daytime?	60	47	30	24	14
(15) Why do these creatures sleep during the day?	5	25	35	12	40
(16) What animals catch their food by night?	70	33	50	30	44

Other head teachers submitted the results of the tests in another form, and gave the percentage of satisfactory replies for each of the sections.

The following table indicates the results as thus recorded :

Section.	Results.			
	School F.	School G.	School H.	School I.
	%	%	%	%
I. Human Cultures and their Development in Time	80	50	57	37
II. States of Matter	50	62	74	51
III. Geography	60	56	69	51
IV. Biology	70	50	54	53
V. Descriptive Zoology and Botany	50	59	58	55
VI. Elementary Physiology	50	54	64	53

One head mistress gave an analysis of the results which showed how many questions were answered accurately by each of the 43 pupils in the class. In the first section—*Human Cultures*—1 pupil answered the whole of the 40 correctly ; another 39 and another 38 ; 25 were able to answer 30 or more ; 12 others more than 20 ; and only 7 failed to answer 50 per cent. of the questions.

In the second section—*States of Matter*—4 had all correct, 5 all but one, and 10 all but two. Only 4 failed to score 50 per cent. The third section—*Geography*—had 25 questions. One had all correct, two had 24 correct, one had 23 and four 22. Eighteen answered 80 per cent. or more correctly, and only five had less than 50 per cent. right.

In *Biology*, of the 18 questions, 2 had all right, 8 had 17, 8 had 16, 6 had 15 and 6 had 14. In answering questions on this section only 2 failed to answer 50 per cent. In *Zoology*, of the 15 questions, 4 had all correct, 7 had 14, 2 had 13, 4 had 12 and only 5 failed to answer at least 50 per cent. The questions in *Physiology* gave rather more trouble to this class, 12 failing to score 50 per cent. Two, however, had all 16 correct, one had 15, and two had 14.

This teacher forwarded the written answers of a pupil to illustrate the method used in testing. The summary of results indicated that the information which Mr. Wells suggested might be gained by children of the age of seven was actually acquired by some of the pupils.

In commenting on the questions and answers, one head teacher made the following observations :—

Section I (*Human Cultures*).—The question on barter and exchange was not understood at first. The term ' Beasts of burden ' was not known, but their work and kinds were well and quickly given.

Section II (*States of Matter*).—The terms ' liquids,' ' solids,' and ' gases ' were not known, but good equivalents were offered, e.g. ' Pouring things,' ' Things you hold,' ' Steam.'

Section III (*Geography*).—The cardinal points were not generally known ; 12 per cent. knew them well and answered well. 100 per cent. was the result regarding questions on nearest hill, river, etc.

Section V (*Zoology and Botany*).—In this section, 50 per cent. standard was reached. A higher standard would have been reached had the children grasped some of the questions better ; e.g. ' How are seeds scattered ? ' to which the answer was given, 'You throw them so.' A similar point was made by two other head teachers in reference to several questions, though no such reference was made by any of the others. This fact, however, illustrates the difficulty inherent in framing questions for young children without a knowledge of their school and home life, and therefore of their normal vocabulary.

Another return showed the results for the whole of the questions. Counting each part of a question as one, the total number of marks obtainable was 128. The questions were answered on paper by all the thirty 7-year-old children in the class. The results obtained are shown on the following page.

The Head Teacher wrote : ' I have given you the complete results, including those of the " dull and backward " ones. The result was 76 per cent. ; counting 50 per cent. of the marks as a pass, there were 23 out of 30 who passed.'

No. of marks gained.	No. of children.	No. of marks gained.	No. of children.
93	1	68	1
89	1	67	2
84	1	66	2
80	2	65	3
79	1	64	1
78	2	62	1
75	1	50	2
74	1	44	1
73	1	43	1
72	1	40	1
71	1	34	1
69	1		

General Observations.

An examination of all the results recorded suggests that the scope of the work included in this section of *The Informative Content of Education* is within the comprehension of children of the given age-group. In one case the head teacher of a senior school who witnessed the giving of the test remarked that it might have been thought that some of the questions had been based upon an actual scheme of work used in the school.

All the questions were not equally well answered by the pupils in any school and, of course, there were marked differences between the schools. The questions on some sections occasioned more difficulty than those on others. For example, the means by which man ensured a supply of food by taming animals does not appear to have been so well known. There were, of course, difficulties in the use of terms, like 'liquids,' 'solids,' and 'gases,' where these had not been taught; but even these were known in many cases.

There would appear, therefore, to be no reason, if it be agreed that the information indicated by Mr. H. G. Wells in Grade A should be taught, why it cannot be taken with children of this age-group.

JUNIOR SCHOOLS.

The nature of the replies to last year's questionnaire from head teachers of infants' schools necessitated the use of questions such as those to which reference is made in the preceding pages. With regard to junior schools, however, the position was different. It will be recalled that the replies received from head teachers of these schools indicated that definite plans of work were formulated and, in some cases, that the scope of the work suggested by Mr. H. G. Wells in his address on *The Informative Content of Education* was actually covered.

In reference to these schools, therefore, the Committee endeavoured to obtain copies of syllabuses in actual use. These, it was thought, would illustrate the measure of agreement between what was, in fact, being taken in some schools and what was suggested by Mr. Wells.

Each subject was considered, and head teachers who had reported that what Mr. Wells suggested was taught in their schools were requested to supply copies of their syllabuses in that subject. A number of head teachers readily responded, and interesting syllabuses were received. From these the following are quoted. The fact should be borne in mind that they are schemes of work for children of the ages 7 to 11.

I. History.

(*a*) A London Junior Mixed School.

Main Purposes of the Scheme.

(1) To explain the place occupied by British History in the story of the world, and more particularly in the story of the people of Europe.

(2) To furnish pictures of human life connected with tales of human experience, and types of human conduct in the chief epochs and among the chief races of mankind ; and to foster feelings of human sympathy and admiration.

(3) To convey some idea of the long and difficult process by which human civilisation has come to be what it is, and the debt under which we lie to the great men of all nations.

(4) To give an outline of the story of the British people, with clear pictures of the representative incidents and representative men and women ; and to connect this outline with the state of the nation at the present day.

(5) To give some conception of the growth of London and to take advantage of visible monuments that connect the present with the past.
Visits will be paid to museums and buildings of educational value, or of local, national or historic interest.

(6) To suggest duties and opportunities which free citizenship implies, both in local and national affairs.

Outline of Scheme.

1st and 2nd years : People of Long Ago.

In simple form, the story of these peoples of long ago whose thoughts and works have greatly influenced the development of the British race, and are still influencing it to-day.

An attempt is made to cover, in bold sweeps, a stretch of the history of antiquity, on its social and picturesque side. The childhood of nations is the fittest material—rich with old fancy and adventure—and preserves the living spirit of the earlier ages. The spirit and temper are akin to those of young children ; the conditions of human life which they depict are simple, striking and easily imagined.

(The scriptures of the Old Testament cannot be studied intelligently without some rudimentary knowledge of the ancient Empires of Egypt, Assyria and Persia, for the history of the Hebrews is, to a great degree, an account of their relations with those Empires.)

Some summary notions about the Greeks and the Romans.

3rd year : A Set of Lessons on Famous Men and Famous Deeds.

Continuation of the above story to modern times in the form of biographies.

Deals mainly with personal character and prowess, discovery, invention, and with the way in which men have lived and worked. A study of general history, in rudimentary form, revealing the truth that Englishmen are under a debt hardly less great to the people of other nations than to their own. Any tendency to confine the attention solely to our own country is indefensible ; it cannot but tend to produce insularity of ideas, and to foster that false sense of patriotism which ignores or despises other countries.

4th and 5th years : Making the Homeland ; Building the Empire.

Story of the British race from earliest times to the present day.

An attempt at a brief and rudimentary introduction to the ' science of history ' and to some concrete ideas of how a history book comes to be written, what material the historian uses, and what kind of evidence he has for his statements.

Systematic lessons on citizenship, local and national, and the high and responsible duties of every Englishman to-day. Understanding of the great changes in national life and the rights and duties of a citizen.

Visits to historical places, collections, etc., with lessons interwoven to stimulate interest.

Lantern slides.

Details of Scheme.

1*st year.* *Class* 5.

People of Long Ago.

The story of those peoples of long ago whose thoughts and works have greatly influenced the development of the British race, and are still influencing it to-day.

1. A Great Traveller of Long Ago.
2. The Meeting of Isaac and Rebecca.
3. Joseph and his Brothers.
4. David and Jonathan.
5. The Nile and the Pyramids.
6. The People of the Nile.
7. Two Great Cities, Babylon and Nineveh.
8. The First Great Sea Traders.
9. A Great King of Persia.
10. The Wonderful Land of Greece.

The Tale of Troy.

11. The Coming of Paris to the Palace of Menelaus.
12. The Fight of Hector and Achilles.
13. The Departure of the Greek Ships from Troy.
14. How the Romans made their Empire.

2*nd Year.* *Class* 4.

People of Long Ago.

1. A Great Traveller of Long Ago.
2. The People of the Nile.
3. Two Great Cities, Babylon and Nineveh.
4. The First Great Sea Traders.
5. A Great King of Persia.
6. The Wonderful Land of Greece.
7. Helen of Troy.
8. Solon and Crœsus.
9. Pheidippides the Runner.
10. Leonidas the Spartan.
11. How the Romans made their Empire.
12. Romulus and Remus.
13. The Childhood of Horatius.
14. Horatius and the Bridge.
15. Regulus.

3*rd Year.* *Class* 3.

1. A Famous Conqueror : Alexander the Great.
2. A Famous General : Hannibal.
3. A Famous Roman : Julius Cæsar. How he came to Britain.
4. Some Famous Wanderers : The Goths.
5. A Famous Prophet : Mohammed.
6. A Famous Ruler : Charlemagne.
7. Some Famous Warriors : The Crusaders.
8. A Famous Saint : St. Francis of Assisi.
9. A Famous Peasant Girl : St. Joan of Arc.
10. A Famous Explorer : Christopher Columbus.
11. A Famous Preacher : Martin Luther.
12. A Famous Monarch : Louis XIV of France.
13. A Famous American : George Washington.
14. Another Famous Conqueror : Napoleon.
15. Some Famous Inventors.
16. A Famous Patriot : Garibaldi.
17. A Famous Queen : Victoria.

4th Year. *Class* 2.

1. Old Stone Men ; New Stone Men.
2. The Men who used Bronze. The Men who used Iron.
3. The Britain of Long Ago.
4. How the English changed Britain into England.
5. Alfred the Great.
6. Edward the Confessor and William the Conqueror.
7. The Normans take possession of the English villages.
8. The Village Church and its Priests in Norman Days.
9. Life in a Monastery ; its food and money ; the Friars.
10. A Great King and a Great Archbishop.
11. Some Boys and Girls of Long Ago.
12. The people gain power from the Kings.
13. A Mediæval Town in the time of Edward III.
14. The Black Prince and his son Richard.
15. Two Great Leaders : Henry V and Joan of Arc.
16. The First English Printer.
17. Warwick the Kingmaker.
18. An English Town of Long Ago.
19. The Great Tudor Rulers.
20. Sir Thomas More.
21. Good Queen Bess.
22. Mary Queen of Scots.
23. Drake and the Men of Devon.
24. A peep at Shakespeare's London.
25. Dissolution of the Monasteries ; Changes in the Parish Church.

5th Year. *Class* 1.

1. Changing Times.
2. Scottish Kings and English Subjects.
3. Civil War in England.
4. Puritans and Cavaliers.
5. Oliver Cromwell.
6. The King comes back.
7. Whigs and Tories.
8. English life in the Seventeenth Century.
9. The Duke of Marlborough.
10. Sir Robert Walpole.
11. William Pitt and Empire Expansion.
12. London Life in the Days of Dr. Johnson.
13. George III and Empire Losses.
14. New Ways for Old.
15. Coal, Iron and the Steam Engine.
16. The Rise of the Cotton Manufacturers ; a Lancashire Cotton worker.
17. The Coming of the Factories.
18. The Coming of the Railways.
19. Nelson and Wellington.
20. Remarkable changes.
21. Sir Robert Peel and Free Trade.
22. Gladstone and Disraeli.
23. Empire Builders.
24. Our own times.
25. The British Commonwealth of Nations.

(*b*) A Cannock Junior Mixed School.

Points to Note.

Full scope should be given to the constructive and expressive powers of the children in making models, drawing pictures and picture charts, or acting scenes from the lives of which they have heard or read.

The children themselves should take an active part in the lesson, and not be merely passive listeners. They should be encouraged to ask questions and to re-tell the stories which they have heard.

The stories should be illustrated with large pictures showing a particular incident in the story, or with simple blackboard sketches in coloured chalks giving details of the dress, housing, ships, weapons, etc., of the period in which the story is set.

1st Year (7–8).

1. The Children of the Trees.
2. Ko, the Cave Boy.
3. Big Grom, Little Grom and their Boat. (New Stone Age.)
4. The Shining Axe. (Discovery of Metal and its Usage.)
5. Bel of the Blue Lakes. (Life in a Lake Village.)
6. Men who baked their books.
7. Nebka of the Nile. (Egypt 6,000 years ago.)
8. Joseph in his own Land.
9. Joseph in Egypt.
10. How Hanno sailed the Great Seas : a story of Tyre.
11. The Olympic Games.
12. Cyrus, King of the Persians.
13. A Boy of Ancient Greece (Xenophon.)
14. Pheidippides the Fast Runner.
15. How Esther saved her People.
16. Gwent the Briton (20 B.C.)
17. Pericles of Athens.
18. Alexander and his Horse.
19. Alexander's March to India.
20. Romulus and Remus.
21. Horatius.
22. Mucius the Left-handed.
23. Coriolanus.
24. Hannibal crosses the Alps.
25. Julius Cæsar.
26. How the Eagles came to Britain.
27. 'The Die is Cast.'
28. The Travelling Emperor, and his Great Wall in Britain.
29. Saint Paul.
30. The Story of the Flaming Cross.

2nd Year (8–9).

1. Nathan the Little Jew. (Holy Land, 10 B.C.)
2. Alaric the Goth.
3. Harald of the Creek.
4. Mohammed.
5. Charlemagne.
6. Hugh of the Greenwood. (Life about A.D. 1160.)
7. The Crusaders.
8. St. Francis of Assisi.
9. Martin the Tumbler. (Thirteenth Century.)
10. How Pete went to London. (Wat Tyler.)
11. Joan of Arc.
12. Little Lady Margaret. (A.D. 1588.)
13. Martin Luther.
16. Patience the Little Pilgrim.
17. Louis the XIVth of France.
18. Oak-apple Day.
19. Kit the Charcoal Burner. (Iron Industry, A.D. 1700.)
20. George Washington.
21. Gillet Sharp the Weaver's Son. (Woollen Industry, A.D. 1730.)
22. Napoleon.
23. Sally Sims, the Little Spinner. (Cotton Industry, A.D. 1730.)
24. Some Famous Inventors.
25. Paul Somers makes the Great Trek.
26. Mary Martin emigrates to New Zealand. (1850.)
27. Garibaldi.
28. Queen Victoria.
29. Nurse Cavell.

3rd Year (9–10).

1. The Britain of Long Ago.
2. How the English changed Britain into England.
3. Alfred the Great.
4. Edward the Confessor and William the Conqueror.
5. How Oakleigh Hall was built.
6. A Great King and a Great Archbishop.
7. Some Boys and Girls of very long ago.
8. How the Lord of Oakleigh returned from the Holy Land.
9. The People gain power from the Kings.
10. How the Lord of Oakleigh went to France : and how Oakleigh fared in the days of 'The Death.'
11. The Black Prince and his son Richard.
12. Two Great Leaders, Henry V and Joan of Arc.

13. Warwick the Kingmaker.
14. White Rose and Red.
15. An English Town of Long Ago.
16. Sir Thomas More.
17. How an Oakleigh sailed the Southern Seas.
18. Good Queen Bess.
19. Mary Queen of Scots.
20. Drake and the Men of Devon.
21. A Peep at Shakespeare's London.
22. For King or State.
23. When Bonaparte watched our shores.
24. Oakleigh Manor and the Great War.

4th Year (10–11).

1. Columbus discovers the New World.
2. Two Martyrs.
3. The Tragedy of a Queen.
4. Sailing round the World.
5. Kings and Queens in Tudor and Stuart Times.
6. The Pilgrim Fathers.
7. The King and the Commons.
8. The Pilgrim who went to Prison.
9. The Fire of London.
10. Great Lighthouses.
11. The Seven Disobedient Bishops.
12. The Man of Fashion and the Preacher.
13. Clive in India.
14. Wolfe in Canada.
15. A Great Inventor.
16. Nelson at Trafalgar.
17. The Surrender of Napoleon.
18. Swift Nick of the Highways.
19. The First Railway.
20. The Great Trek.
21. The Lady of the Lamp.
22. Australia's Brave Explorers.
23. A Great Missionary.
24. A Great President.
25. A Great Life-saver.
26. The Children's Friend.
27. The Story of the Atlantic Cable.
28. The First Flight Across the Atlantic.
29. ' In this Sign, Conquer.'

II. Geography.

(*a*) An Ealing Junior School.

1*st Year.*

(1) *Children of Other Lands.*

The Red Indian.
The Eskimo.
The Dutch.
The African Pigmies.
The Arabian.
The Japanese.
The Kirghi.
The Swiss.
The Norwegian.
The Greeks.

All these lessons should be freely illustrated by drawing, modelling, either by individuals or as class efforts.

(2) *Simple Map-making.*

1. My Walk to School.
2. My Walk to the Station or to the Main Road.
3. Maps to illustrate certain stories : e.g. Winnie the Pooh visits Christopher Robin.

(3) *Physical Geography.*

Simple explanation of physical phenomena as they occur, viz., snow, rain, hail, fog.

The Sun. Where it rises and sets. Sun shadows, when long, when short.

2nd Year.

(1) *Many Things from Many Lands.*

Market Day in a Market Town.
Going Shopping.
A Fur Coat.
The Daily Newspaper.
Our Bread.
Canterbury Lamb.
Oranges and Lemons.
Dates and Deserts.
Tea, Rice and Silk.
More about Tea.
A Reel of Cotton.
Rubber and its Story.
The Harvest of the Sea.
All Sea Roads lead to Britain.

(2) *Physical Geography.*

Simple explanations of all natural phenomena as they occur in the lessons above.
A River. Source, basin, tributary, mouth, etc.
The work of rivers, sea, ice, etc.
Deserts, oases.

(3) *Map-making.*

Simple maps and plans of local features and the surrounding neighbourhood, not to scale, but with a reasonable amount of proportion.
Cardinal points.

All lessons to be well illustrated by pictures, and where possible models made by the children.

Occasional short written tests to be given.

3rd Year.

(1) *Round the World.*

Modern Methods of Travel.
Westward Ho ! The Atlantic Ocean.
Across Canada.
Canada to Japan.
Across the Old World.
Eastward Bound.
The Nile and the Desert.
India.
From India to China.
China.
Across the United States.
South America.
The Dark Continent.
New Zealand via Panama.
The Australian Commonwealth.
The Polar Regions.

(2) *Physical Geography.*

Explanations of physical phenomena introduced into lessons above.
The Earth's Crust, Mountains, Hills, Valleys.
Land and Water.
The above with special references to local features.
Rainfall, effect on productions.
Map-tracing and simple plans.

Modelling and drawing should be used to illustrate lessons where possible, and later in the year an attempt should be made to draw plans to scale.

4th Year.

(1) *The British Isles.*

The Bread Lands.
The Orchard Lands.
The Pennine Moorlands.
Market Towns and County Towns of the North.
Ports and Fishing Towns.
The Way to Scotland. The Highlands.
Ireland.
Ireland to Wales.
Counties of the South-West.
Lowlands of England and Scotland.
London.
The Railways.

The above lessons to be accompanied wherever possible by brief notes, and sketch maps.

(2) *Local Geography.*
Talks on Local Industries.
Visits when possible to Local Factories.

(3) *Maps.*
Contour lines and sections.

(4) *Physical Geography.*
Temperature. The Thermometer. Isotherms.
Rainfall. The Barometer. Isobars.
Physical causes of World Regions.
Typical Productions and Peoples.
Connection between Climate and Occupations.
Day and Night.
The Seasons.

(*b*) A Cambridge Junior School.

General Considerations.

1. The work must be thought of in terms of activity and experience.
2. The work must be suited to the development and interests of the boys.
3. Two main sections :
   (i) Observational work, Home Geography, Mapping.
   (ii) Regional and World Geography.

Age-Group 7 *to* 8 *years.*

Section I.

Simple weather records as rain, snow, sunshine, wind, leading to elementary facts of climate.
Rain—where it comes from, where it goes ; value ; why does the river sometimes overflow its banks ? ; wearing of the roads.
The River and the Railway ; where they go, and what they carry.
Apparent daily movements of the sun—shadows.
Wind vane.
A map of my classroom—where I sit.
The way I go home.

Section II.

Folk Tales and stories of people in other lands—Eskimos, Negroes, Chinese, Desert folk, Forest folk, Grassland folk—to bring out the main facts of their environment—nature of country, climate, and how they live—food, shelter and clothing.

Age-Group 8 *to* 9 *years.*

Section I.

Weather records including wind charts—cold and warm winds, wet and dry winds.
Simple plans of classroom, school and playground, streets near the school.
Measurement by pacing to lead to idea of simple scales.
The cardinal points.
Rivers and running water—our sluggish river, contrasted with mountain streams.
Hill, mountain and valley.

Section II.

Types of relief—highland, lowland ; coasts.
Types of climate—hot, cold, wet, dry.
Types of life—hunting, fishing, pastoral, agricultural, manufacturing, trading.

Study of pictures, and reading of simple descriptive stories of the people and their environment.
Illustrative handwork.

Age-Group 9 *to* 10 *years.*

Section I.

Weather records introducing the thermometer and barometer—making simple graphical records.
Plan of the school district.
The use of colour layers to show configuration—introduced by pictures and air photographs side by side with map.
Scales of maps as development of scale drawing of simple plans.
The map of England—position of Cambridge and other known places on the map.

Section II.

British Isles—relief, climate, occupations, some important towns.
Geography of the more common products of the World—tea, sugar, rice, wheat, wool, cotton.

Age-Group 10 *to* 11 *years.*

Section I.

The map of Cambr[illegible]hire—climate and soil, crops, industries.
The Fens and their drainage.
Study of maps of other countries—comparative areas leading to a simple idea of density of population.

Section II.

Simple studies of the principal geographical regions of the British Isles and how interrelated.
Simple World studies—mainly a welding of the facts learned in previous classes, a conception of the World as a whole, the position of the continents, oceans, more important countries, and a few cities.

III. Science.

(*a*) A Cannock Junior School.

Nature Study.

Points for consideration of class teachers.

(1) The main aim of the teaching should be to keep alive and quicken the spirit of wonder and inquiry and to give it appropriate scope for activity.

(2) A special task of the Junior School is to satisfy a growing desire to construct. This can be met by giving them practical work to do in connection with their first-hand observation of plant and animal life.

(3) The children's observations need to be directed by questions, and their experiences are incomplete if they do not express them in concrete form such as written notes or drawings. Modelling in suitable material is a useful aid to visualising form and structure, and the making of notebooks and portfolios for nature records gives scope for other handwork activities. The children should be encouraged to make simple insect cages, to fit up small aquaria and wormeries, and to grow their own seeds and bulbs at home.

(4) Make full use of the School Garden, as much of the subject-matter has been chosen on the assumption that the children will be watching the plants and insects which may be found there, and that individual interests in it have been established.

(5) The value of Nature Walks, each with a definite object in view, should not be overlooked.
(6) Nature Calendars : records of wind and weather, plants and animals, seasonal arrival and departure of common birds, etc., to be kept as in Geography Scheme.
(7) It is very important in Nature Lessons to see that every child has actual specimens to observe and examine. The provision of one or two to be shown to the class as a whole is almost useless.
(8) In the earlier stages the children should make straightforward observations and collect simple facts.

1st Year (7 *to* 8).

Autumn Term.

Preparations made by plants for the next year.
Study of Fruits :
1. To understand what is meant by a fruit. Snapdragon. Plum.
2. General knowledge of fruits in a hedge.
3. Some winged and succulent fruits and their dispersal.

Planting of seeds and bulbs (class garden plot).

Spring Term.

1. Continuation of above idea.
   Life history of a hyacinth and study of the bulb.
2. Life in water.
   Animal studies : (i) goldfish ; (ii) frog.
3. Spring awakening :
   (*a*) The awakening of the hedge ;
   (*b*) Horse chestnut and sycamore seedlings.

Summer Term.

Full life and flowering time.
1. Flowers' dependence upon insects. The pollination of flowers as the condition of seed formation.
   Hawthorn, Bluebell, Sycamore (the last wind-pollinated).
2. Insects' dependence upon plants.
   Life history of a common butterfly and a common moth.

2nd Year (8 *to* 9).

Autumn Term.

1. As last year, preparations made by plants for next year.
   Fruits :
   (*a*) In the hedge : Blackberry, Hips and Haws, Hazel Nuts, Wild Parsnip or Cow Parsley, Burdock.
   (*b*) In the garden : Hollyhock, Nasturtium, Apple.
   Bulbs : Daffodil.
2. Resident winter birds ; how they obtain food.
   Soft-billed : Blackbird, Thrush, Starling, Robin.
   Hard-billed : Sparrow, Finches, Yellow-hammer.
3. Hibernation of animals. Study of snails, Chrysalids.

Spring Term.

Spring awakening.
1. Birds which come inland or southward ; Water birds, Fieldfare.
2. Animals which winter in the soil : Earthworms.
3. Growth of Daffodil. Hazel catkins, Willow catkins. Broad Bean, Mustard and Cress, Sunflower seeds.

Summer Term.

1. Further flower study : Buttercup, Poppy, Wild Rose, White Dead Nettle, Sweet Pea, Dandelion, Groundsel, Thistle, Goatsbeard (chiefly for their fruits).
2. Climbing plants : Sweet Pea, Runner Bean, Wild Rose.
3. Continuous study of snails. Life history. Slugs.
4. Life in water : Pond snails, Pond insects, e.g. Water Beetle, Dragonfly, Caddis Worm.

3rd Year (9 *to* 10).

Autumn Term.

1. Preparations for continuing life of race or individual plants other than by seeds.
   Study of a whole plant, whose life history has been watched : the Broad Bean.
   Study of surface and underground stems : Violet, Cinquefoil, Goatweed.
   Food storage : Potato, Crocus corms, Root tubers of Celandine and Wood Anemone.
   Non-flowering plants : Toadstools and Puffballs.
2. Continue study of birds, Bird table, Residents and Migrants.

Autumn and Early Spring Term.

3. Definite gardening begins. Boys dig and prepare their own plots. Life of the soil. Cockchafer and other beetle 'grubs' and pupæ. Millipedes and centipedes. Woodlice. Simple soil experiments.
4. Non-flowering plants, Mosses, Lichens, Moulds.
5. Simple experiments with seedlings to find out the best conditions for their growth.
6. Life history of crocus.

Summer Term.

Pond life. Recognition and growth of common water plants. Water insects, e.g. 'Bloodwork,' Gnat and other fly larvæ. Water spiders. Newts.
Life in the Garden. Certain life histories. Underground food storage, e.g. Carrot, Radish.

In the later stages children's observations should become more detailed and the facts collected should be related in the form of continuous studies.

4th Year (10 *to* 11).

Autumn Term.

1. Preparation of plants for winter.
   Tree study. Form from the mass of a tree. Leaf changes and fall. Evergreens ; relation to climate and altitude. Protection of deciduous trees in winter. Recognition of winter buds and interpretation of markings of twig. Simple analysis of tree form.
2. Spiders—especially the Garden Spider and the House Spider.

Spring Term.

1. Opening of buds. Different kinds of bud scales and leaf arrangement.
2. Experiments to find out how water is drawn up a plant.

Summer Term.

Study of weeds, their root and leaf systems, flowers and fruit.
Study of Woodland and Ditch.
Plant Galls.

The above scheme is augmented by the series of Nature Talks from the B.B.C., entitled *Round the Countryside*. The syllabus of these talks will be found in the B.B.C.'s Handbook. A short preparation on general lines should be made immediately before the broadcast, and a preliminary examination of specimens, pictures, etc., may be made.

Health and Hygiene.

General Observations.

It is fatal to the formation of healthy habits, and the creation in the pupil's mind of the right attitude towards health, to attempt to separate theory from practice.

Instruction in health should be related to the habits of the individual and the needs of the community.

Scheme.

In all classes hair, hands, nails, teeth, clothes (tidiness), boots, will be subjects of daily inspection as per time-table.

For milk and lunch classes must use the tablecloths provided and table manners must be taught. Milk caps, straws, papers, etc., to be placed in receptacle and classroom made tidy.

During the first three years the pupils will not be given set lessons in hygiene, but matters of health and personal hygiene will be taught incidentally and as opportunity arises.

Fourth-Year pupils will be given a twenty minutes' lesson weekly on the following :

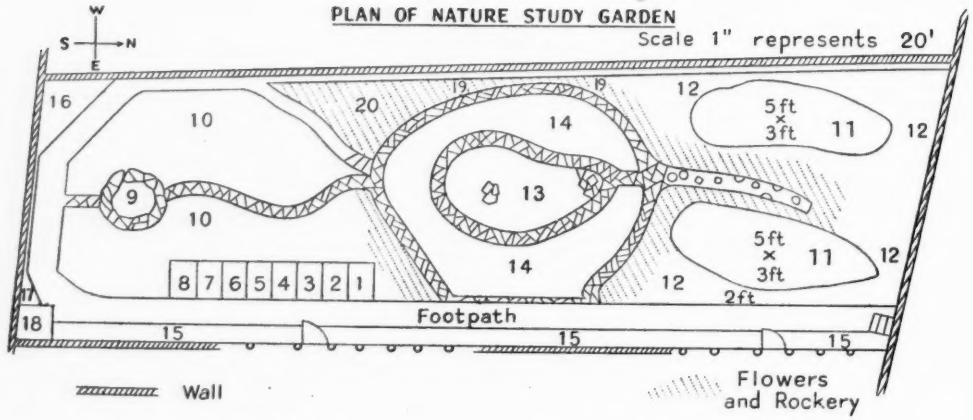
The Skin : pores and sweat glands ; soap and cleanliness.
Breathing : the lungs ; correct breathing ; colds and infection ; clean handkerchief ; value of physical exercises.
Fresh Air and Sunlight : stale air and fresh, contrast ; bedtime ; the sun (lights, warms, cleanses, cures) ; outdoor games ; artificial sunlight ; town planning ; daylight saving.
Posture : value, and marks of good carriage ; common faults, and causes ; correction of poor carriage ; walking, footwear.
Digestion : the fire in our bodies : fuel for the body ; the ashes or waste ; manners when eating.
Teeth : made for use ; value of eating crusts ; care of teeth ; school dentist.
Hair : the root ; oil sacs ; cleanliness, nits ; care of hair.
Nails : dirt and germs in ; nails of cat, dog, horse, etc. ; how to trim and clean.
Sleep : great need for ; proper conditions for sound and restful sleep.
Safety First : how to cross the road ; dangers of street corners ; riding bicycles carelessly ; hanging on to the backs of carts ; traffic lights and Belisha Beacons.

Use pictures from ' Health and Cleanliness Council.'

(*b*) A Shropshire Junior School.

Nature Study.

This is based upon a Nature Study Garden, which has been arranged for the purpose. It illustrates the modern method by which schools teach through actual experience and shows how vitality is given to the curriculum.



1. Trees planted 1937.
2. Cuttings.
3. Annuals.
4. Biennials.
5. Thinning.
6. Trenching and non-trenching.
7. Corn.
8. Insect cage.
9. Fernery.
10. Trees.
11. Bulbs and low-lying shrubs.
12. Low-lying shrubs.
13. Pond.
14. Grass.
15. Flowers.
16. Rubbish.
17. Sand.
18. Tool Shed.
19. Climbing trees and plants.
20. Birds' nesting box.

The Nature Study Garden.

As the Nature Study Garden has become the centre of outdoor activity and an essential link between the Classroom and the Countryside, a brief summary of the Nature Study Course is given.

1. *The Individual Child* is encouraged to keep his own pets and to grow his own plants at home, and judiciously to collect specimens for the Nature Tables, the Insect Cage, and the Pond. These recreational home activities of the children have proved a great success with a large group of children, including some of the retarded boys.

2. *In the Classroom* specimens are examined and an endeavour is made to make some systematic studies and to note some of the general laws of nature.

3. *The Central Nature Tables* serve as a general record of the changing countryside during the seasons, and provide a means for the continuous study of simple experiments and observation of insect and pond life.

4. *The Nature Study Garden* provides lawn, rockery, herbaceous border, fernery, shrubbery, pond, nesting boxes, and 'Nature Plots' where each year simple experiments can be made under ideal conditions (see below).

5. *The Nature Walk.* In the immediate neighbourhood there is a wealth of nature material in lanes, fields, woods, streams, and ponds. The aim of the walk is not the collection of innumerable specimens, but the cultivation of habits of observation. Preparation is made beforehand to avoid its degenerating into a hurried scramble.

6. *The Nature Study Library* contains a series of reference Nature Books for Juniors, e.g. the 'Look and Find Out' series. With the help of these the children can find out for themselves and identify many of their discoveries.

The Nature Study Course is made as recreative as possible, but at the same time it includes special studies where accuracy is insisted upon. It followed, therefore,

that when the School Garden was being remodelled an effort was made to provide it a place where simple experiments and demonstrations could be undertaken, *but* also a place of beauty in which both teachers and children could take a pride.

The site, long and narrow, presented some difficulty in layout, while recently erected buildings on one side did not make things easier.

The main features aimed at were :

1. Attractive features, pond, rockery, etc., in the right setting so far as was practical.
2. A central Meeting Place where a class might gather for a short talk.
3. All parts of the garden to be easily accessible by paths.
4. A large pond where the common pool creatures could be kept in their natural surroundings.
5. An insect cage where the life-story of common insects could be kept under close observation.
6. Different situations and aspects where rock plants, herbaceous plants, ferns, shrubs, etc., could be grown.
7. ' Nature Plots ' where simple experiments could be carried out.

During 1938 the following work was done :

Plot 1. Trees from seed, planted 1937 ; the rate of growth of the different trees to be noted during a period of four years.
Plot 2. Plants from cuttings. (Planted September 1937.)
Plot 3. Annuals : Growth, flowers, and seed, noted.
Plot 4. Biennials during second year. (Carrots, wallflowers, etc.)
Plot 5. Simple experiment in thinning and transplanting with lettuce. (Lettuce also used for feeding the silkworms.)
Plot 6. Corn and wheat, spring and autumn sowing ; oats and barley.
Plot 7. Simple experiment in good (i.e. ' deep ' in this case) cultivation. Parsnips sown (*a*) soil trenched ; (*b*) soil lightly forked.
Plot 8. Insect Cage containing cabbages—larvæ of Cabbage White—black currant bushes—larvæ of Magpie Moth—and nettles—larvæ of Tortoiseshell Butterfly.

Scheme of Work.

The course is recreative rather than formal, but at the same time special studies are made where accuracy is insisted upon. No detailed scheme of work is imposed as an effort is made to keep close to the normal experience of the children. Much of the work depends, therefore, on the specimens found in the district and on the observations made in the School Nature Study Garden.

The scheme is arranged in relation to the seasons and is concentric in method, more detail and suggestive reasons being given as the child proceeds through the school. In the junior school stage children take pleasure in collecting ; they begin to assert themselves, and to show recognition of cause and effect. Moreover they begin to take an increasing interest in living things, and the aim of the Nature Study should be to encourage and guide this interest.

Neither the scheme nor the time-table is rigid ; the amount of time given increases in the spring and summer, and depends on the interesting specimens to hand and on any special phenomena in the school pond or insect cage.

In the classroom notebooks are used and children are encouraged to sketch and register. Books of reference are essential to the course for both teacher and child to explore together. Simple experiments on germination, plant growth, and examination of different soils, are included in the course. The Central Nature Tables are a means for the continuous observation of simple experiments and

of pond and insect life; while they serve as a general record of the changing countryside.

Seasonal Course.

Spring.

Season of reawakening—catkin two kinds of flowers—germination of seeds—effect of light, warmth, water. Opening of buds of common trees—early spring flowers—collection. Continued observation of growth of bulbs. Bulbs, corms, roots in general. Growth of potato tubers under different conditions.
Insect life—life-story of a frog—May flies.
Reappearance of pond life.
Study of caterpillars on appropriate food plants in Insect Cage.

Summer.

Summer flowers—collection of wild flowers—the meaning of flower—the uses of nectar, colour, and fragrance, in attracting profitable insect visitors—interrelation of flowers and insects. Study of the plant—simple experiments to show absorption of water, loss of water, etc.—effect of light—arrangement to avoid overcrowding. Result of summer work—the filling of tubers and other storehouses. Formation of next year's buds—the making of seeds and fruits. Insect and pond life—life histories—silkworm moth—cabbage white—Red Admiral Aphis—Ladybird Bees.
Food—Self-protection—care of young. Beneficial insects—ladybird, lacewing fly, hover fly, ichneumon fly. Summer in the pond—caddis fly larva, boatmen, scorpion, dytiscus beetle.

Autumn.

Harvest time—kinds of corn—fruits—worm-infected apples—falling leaves—time of 'fall'—exhibition of brilliantly coloured leaves collected by children—network of 'veins' in skeleton leaves. Earthwork—burrows with leaves half in—Darwin and Shropshire—his account and experiments with earthworms. Fruits collected from various plants—kinds of fruits—uses of fruits. Seed dispersal—breaking, wings or parachutes—adhesion to animals. Fruits and seeds—what they contain. Autumnal migration of birds. Storing of food supplies (distribution of seeds).

Easter Term.

Winter studies—weather and slanting rays of the sun. Evergreens—special study and exhibition collected by children arranged for Christmas. Evergreens and conifers—larch, ivy, holly. Deciduous trees in winter—how to recognise common trees in their winter state. Skeleton leaves—winter flowers—berries—mistletoe. Birds in winter. Dormant chrysalids—hiding place of Red Admiral and Ladybird. Hibernation—squirrel—hedgehog. Simple experiments with soil—clay, sand and loam. Growing of bulbs in fibre and in water.

(*c*) A London Junior Mixed School.

The third scheme is that of a London Junior School. Here, as in the previous schemes, the work is based upon the everyday experiences of the pupils. Here, however, the garden, which plays such an important part in the Shropshire school, is not available; but the head teacher has used the environment of the pupils to give reality to the work.

Science.

Class 1.

Improvements and Progress due to Science and Scientists.
Great Men of Science.
What Science has done for London.
How Science affects the home.

General Topics.

Air :

Takes up space, exerts pressure.
Streamlining.

Composition—

Oxygen :
Living and Burning.
Rusting and Tarnishing—Oxidising.
Galvanising and Painting.
Plating (Tin).
Stainless Steel.
The Supply of Oxygen.

Nitrogen :
Inertness, etc.

Carbon dioxide :
Properties.
Lime Water Test.
Fire Extinguisher.
Mineral Water Drinks.

Water :

Its uses. Three States.
Water Supply. Siphon.
Hard and Soft Water. Fur.
Ice, and Protection of Pipes.

States of Matter—Changes.
Expansion and Contraction.
Solids, Liquids and Gases.
Temperature and its measurement.
Conduction.

Plant life :

Germination—Conditions necessary.
Bulbs and Seeds.
Structure and Functions of Parts of a Flower.
Seed Dispersal.
Could we live without plants ?

Hygiene :

General Structure of the Body.
Functions of the chief organs.
The skin—structure, functions. Importance of cleanliness.
Breathing—Artificial respiration.
Posture—correct carriage—the feet.
Teeth—structure, use, cleaning.
Hair, nails.
First Aid.

How Science ' lends a hand ' in the home.
Building the House. Electric and Gas Appliances.
Chemicals in the Kitchen. Lighting the Fire.
Water. Washing. What happens in the Dust-bin.
Clocks, Gramophone, Radio.

IV. Encyclopædia Work.

An interesting account of another method of increasing the informative content of education was received. This was described as Encyclopædia Work, and the following notes were sent by a teacher in a London junior school where it is practised. It will be obvious that there is a similarity between this method and the Library Scheme used by Sanderson of Oundle.

The work has proved to be a very real contribution to the new approach in education, enriching the teacher's technique and developing the child's initiative. The possibilities are enormous, and the teacher who is eager to experiment enjoys the happy privilege of descending from a high and distant throne, to enter into the personal life of each individual. To-day he can be the most vivid personality in the life of each child.

Factors.

The introduction of encyclopædia work in any school depends chiefly on the following :

(1) A progressive headmaster who has a sympathetic, helpful approach to both staff and boys.

(2) Enthusiastic teachers with an experimental bent, with the ideal discipline of gentle restraint, rather than fearful rigidity.

(3) Elasticity of curriculum to ensure the beneficial fusion of the subjects on the school time-table.

(4) The child's easy access to diverse reference books.

Research Mind.

In any undertaking of merit the underlying factor is sincerity of purpose. The teacher, in the early stages, must strive to foster in the child the *Research Mind*, so that the child's work is always sincere, and not merely the reproduction of a teacher's lesson. Remember that the young child's first efforts at self-expression are like a man's first speech—usually a poor show. There must be continual encouragement, and the child's original manuscript must be treated with respect. It is his work—he is a creative artist in the embryo, seeking to express his thoughts in some direction that holds his interest. Condemnatory marking dries up the fountain that probably would have gushed freely, and so it is essential to allow the young child to write copiously and unreservedly on things that may seem strange to the adult mind. Several little boys of eight were determined to write on such topics as whooping cough, flies, diseases, scooters and furniture. This unfettered choice forms an excellent beginning and soon an encyclopædia takes an alphabetical form ; and slowly the inclination comes, on the child's part, to consult other reference books to supplement his own ideas. At first there may be a paucity of ideas—but as this is natural the teacher should not be discouraged. With smaller boys, it is more satisfactory to compile one big class encyclopædia ; but later, as a natural development, the older boys make their own, or undertake to be responsible for one letter, say A, B or C. The boys begin to specialise in their research ; one boy may do the internal combustion engine, while another writes on primitive houses. Knowledge grows in school and out of it, and after the correct stimulus comes the response. The boy must feel that he is doing something that is of great use, and not a scholastic exercise that is doomed to fall under the marking of the blue pencil and sink into the ignominy of the waste-paper basket. The beauty of the encyclopædia work lies in the fact that the continual practice in self-expression develops his flow of English, frees his style, and enriches his knowledge in a natural manner of the true student. The child is browsing in those early pastures so dear to the heart of any human with a sense of awareness. He is a gleaner, and is learning how to use books and assimilate knowledge.

Practical Suggestions.

(1) Instil the *library habit.* Form a good school library of science, history and geography. It is of inestimable value, however, to encourage the boys to go to the Public Library, tender a ticket and select a book in their own time. At this school the majority of the boys use the Public Library as easily as an adult. This factor cannot be over-emphasised.

(2) Encourage every pupil to amplify his written work by pictures, maps and diagrams of his own choosing. There are so many excellent pictures and photographs available nowadays, that even in the poorest areas children can compile beautiful ones. They lead to discussion, and it is surprising how much children learn when they want to know.

(3) Regard the encyclopædia as the child's personal possession, not a show piece, but an ' honest to goodness ' effort that must be consulted and used.

(4) Disregard the early crudity of the work, for therein lies its strength. One must bear in mind that primitive art was crude, but it held the soul of the future artist.

V. Observations on the Junior School Schemes.

(1) *History.*

An examination of these syllabuses illustrates both the method of approach and the scope of the work attempted in the schools. In relation to the history, much of what Mr. Wells suggested is to be included, but not in the form of definite instruction on the particular section or aspect of history. Thus in none of the syllabuses does there appear a reference to ' The general idea of break-up of Christendom and the appearance of Sovereign States.' Similarly, while the life of Mohammed appears in each, there is no attempt to trace the Rise and Growth of Islam, though further references to this subject would doubtless be made when the Crusades were studied or the Revival of Learning was under discussion. Other sections, e.g. ' The coming of the Aryan-speaking peoples,' are also omitted. One observation should be recorded. The idea that history as now taught in the schools is a matter of ' 1066 and all that ' is not supported by the schemes submitted. Neither is teaching mainly concerned with wars and kings, though some references to both of these are necessary to enable the pupils to understand the reasons for and the nature of the resultant changes in the lives of the people and to appreciate their influence in the creation of present-day conditions.

An examination of these schemes, however, reveals a disposition to refer almost every fact to Britain or the British Empire. In view of the demands likely to be made in future upon the people of this country for an understanding of the conditions and policies of the people of other countries and the possibility of the need for co-operation with them, the Committee think that an extension of the area of comparison and contrast, even at this early stage in the educational course, is worthy of consideration.

In each of the returns received the period devoted to history was said to be 1 hour per week. It will be recalled that the length of time suggested for the subject was 2½ hours. The increasing importance of the subject and the desirable enlargement of its scope indicate that 1 hour per week is too short a period if the work is to be effectively taken. The Committee suggest, therefore, that more time should be devoted to it; they think the present amount of time might with advantage be doubled.

(2) *Geography.*

In Geography, one or other of the schemes included all that was suggested, with the exception of Geology. The time devoted to it was generally 1 hour, which is the same as that indicated by Mr. Wells.

The syllabuses were subsequently submitted to a University Lecturer in Methods of Geography Teaching, who was of the opinion that they were excellent, but they should not be commenced before the age of 8 years. In reference to the first he thought there was insufficient outdoor work included and that the syllabus for the fourth year was too abstract and ambitious.

These opinions will very possibly be shared by others. But the fact of major importance for the purpose of the Committee is that schemes actually in use in schools afford evidence that the proposals contained in this section of Mr. Wells' '*Informative Content of Education*' are practicable and the work suggested is already being attempted.

(3) *Science.*

In Science there were many omissions. None of the schools made any attempt to indicate the Succession of Living Things in Time ; to deal with Geological Ages ; or to give general ideas of Ecology and Evolution. Neither were the sections which included Human Reproduction, Chief Diseases and Enfeeblements, found in any of the syllabuses received. One scheme indicated the approach to physics and chemistry and provided the opportunity to deal with the elementary history of invention and discovery through the biographies of great scientists ; the others dealt with animal and plant life including reproduction, and with personal hygiene ; but the whole scheme outlined by Mr. Wells was nowhere attempted. The time devoted to the subject was 1 hour.

The syllabuses reproduced, together with the foregoing summary, were subsequently submitted for his observations to a University Lecturer in Methods of Science Teaching who has had wide experience in both the teaching of science and the examination of syllabuses in this subject. His comments were as follows :

'I think it is highly improbable that *any* junior school would be attempting to deal with any of the things Mr. Wells suggests as suitable for this stage of instruction—except, perhaps, incidental references to, for example, " the working of our bodies " (i.e. levers in the body, respiration and digestion).

'Though in full sympathy with Mr. Wells' aims and ideals, I do not myself think that it would be wise to deal with material as general as, for example, " the processes in the prosperity, decline, extinction and replacement of species " with children of 7 to 11. Concepts empty of content have little educative value. The difficulty that teachers find at this stage is not to show their pupils what is meant by the evolution of species, but to tell them how any single plant or animal grows from its seed ; i.e. they try to teach how the chicken comes from the egg, rather than how chickens themselves came to be as they are.

'I would be in favour of letting children of 7 to 11 play with scientific materials and apparatus, keep pets and grow flowers and vegetables, browse among a good library of suitable books, play with Meccano sets, visit factories, etc., make models and carry through simple projects requiring co-operative planning and work. But to try to deal with generalisations of wide sweep at this age is to try to grow flowers directly from seeds (like those Japanese flowers made of paper, which one puts in water for a few minutes) ; or, if you like, it is trying to " mow the moss and to reap the green corn."

'So the fact that so little of what Mr. Wells suggests is done is due, not only to the short time (certainly *much* too short) available to children in Junior Schools for scientific studies, but also the realisation (justified, I think) that this generalised and philosophical approach is not suited to juniors.

'Of course, one could reveal a different state of affairs if Senior Schools (11 to 15) were being discussed. And, in my view, Mr. Wells' suggestions would apply much better to these.'

The Committee of the Science Masters' Association, after commenting upon the suggested science scheme for pupils below the age of 7, observed in reference to the section given in Grade B (ages 7 to 11) : ' Although some of the details which are scheduled may be taught didactically and with good effect, the generalisations come too soon. Children of this age are hardly able to distinguish between chemical and physical actions, much less to bear the " foundations of pure physics and chemistry." Such concepts involve classification of phenomena which come easily to the trained mind of an adult but are too remote from the thoughts of a child.'

After consideration, the Committee were of the opinion that there does seem to have been rather too much in Mr. Wells' requirements here ; and they were certainly rather alarmingly phrased. Some at least of them, however, are likely to be, and evidently should be, carried forward.

General Remarks.

The traditional treatment of the curriculum in elementary schools was to deal with subjects separately. Recently, however, greater recognition has been given to the need for thinking of the curriculum as a unit and not in terms of individual subjects. Certainly it is not possible to divide the curriculum into self-contained compartments, and the reasons for the separation of Geography and Science are not apparent. The former has much in common with the latter, which arises out of the study of nature, whether animate or inanimate, and of some of the works of man. From the information before them, therefore, it appeared to the Committee that what seems to be needed is a better recognition of the interrelation of Geography and Science, rather after the pattern of Huxley's *Physiography*, but with greater attention to life in relation to space and time, and how it is influenced by scientific discovery and invention. In like manner, some aspects of Geography are closely related to History. A reconsideration of each of these subjects and their interrelations offers a great opportunity for removing the restricting effect of a classification which, for an active study of the whole environment, is artificial and unhelpful.

SENIOR SCHOOLS.

I.

Last year the Committee expressed the opinion that further investigation was desirable to discover how far the actual teaching in the schools, regardless of the terminology employed, does cover the various sections of the subjects to which reference is made in the outline of an *Informative Content of Education.*

With this end in view, an attempt was made to obtain copies of syllabuses in use in the senior or central schools from which, it will be recalled, was received the best response to inquiries based on Grade C of the *Informative Content of Education.*

Several of these syllabuses have been received. One was from the head mistress of a Stafford school whose replies to last year's questionnaire were as follows :

(a) *History.* ' Practically all is taken in one syllabus or another, with the exception of " detailed study of European history " as mentioned in Mr. Wells' speech. All of it is taken in so far as the sections make contact with English or Imperial history.'

(b) *Geography.* ' Taken almost exactly as indicated except that the Geology side is only simply touched upon.'

(c) *Social Mechanism.* ' " A short history of communications and trade " and " the history of innovations in production and manufacture " are taken, but they are only very inadequately covered, and the " Role of Property and Money in Economic Life " is only dealt with as it affects the other sections of the subject.'

The detailed scheme used in that school is very interesting and suggestive. The syllabuses in Geography and History are arranged in two courses, the 'A' for the brighter pupils and the 'B' for those not so bright. The former are reproduced below. Since they indicated in some measure both the methods of approach and the aims of the scheme, the head teacher's notes for the guidance of class teachers have also been included.

HISTORY.

I. *Aims.*

(1) To awaken and train an intelligent interest in the past and a general desire to emulate the noble and scorn the ignoble; to awaken and train patriotism of the truest type and a keen sense and love of justice.

(2) To develop a general feeling of indebtedness to the benefactors of the past, a loyalty towards those in authority, patriotism towards one's own country, compatriots and co-workers (emphasise class and school loyalty, necessity for 'playing the game' and for true and earnest work on the part of *every* member of the community); necessity for 'administration,' 'capital,' and 'labour' in the outside world—the interdependence of them all and the utter futility of the attempt to destroy any one of the three.

Emphasise also the responsibility of the present generation,

(*a*) to the past;
(*b*) to the present
(*c*) to the future } most essential.

(3) To provide a reasonable basis for the understanding of national affairs and the development of true citizenship, and to lay the foundations for intelligent voting in the future.

(4) To give a reasonable survey and understanding of the struggles, changes and processes by which the England of to-day and the British Empire came into being.

(5) To stimulate a general interest in and give a conception of the British Commonwealth of Nations, its characteristics, functions and government, the responsibility of each part of the Empire, and the interdependence and responsibilities of the Homeland and the Colonies.

(6) To develop powers of judgment, reasoning, imagination and memory and an appreciation of the relics of the past in our own land and elsewhere.

(7) To kindle a lively interest in all useful exploits, adventures and invention as well as in current events.

II. *Suggestions on Method.*

(1) Follow closely the lines laid down in the syllabus so that at the end of the course the contents have been covered as fully as possible.

Divide each year's work into three definite terms' work (allowing some time in third term for revision); enter each term's scope in the space set aside in the Record Book.

Expand each term's work in detail on the lines on which you intend to teach, having *one* central theme—the 'Project.'

Use this expansion as the synopsis on which to write detailed notes of lessons, which should, at their best, indicate methods of presentation, apparatus to be used, etc.

(2) Use the best books available on any heading for class work and in the 'A' sections; in 'B' sections work must be mainly oral lessons and expression work.

Supplement the subject-matter, illustration and description by one's own reading from the more prominent and fuller histories of the period, also by reading appropriate and typical extracts to the class where possible, showing original matter (e.g. copies

of charters, etc.) ; allow brighter girls to read more about any one subject in their own time ; make historical visits wherever possible, and use all available devices which may serve to widen the scope of the teaching.

Be careful to make all teaching very thorough, definite and attractive, and be sure that the presentation is fully understood by the class.

(3) Base teaching on ' Cause and Effect ' and establish the axiom that similar causes lead to similar effects ; teach from the past the lessons of the present and future.

(4) In subjects of controversy avoid personal bias ; give both sides of the question as fully and accurately as possible (where suitable to the age of the child), then leave girls to judge for themselves. If your teaching is adequate they should be able to form a fair estimate.

(5) Make ' personalities ' and ' events ' *live* as far as you can. All teaching must be visual in the girls' imagination if possible. Do not teach bald, dry facts.

' Every step in *knowledge* should be accompanied by practical application and illustration.' (Board of Education Suggestions.)

(6) Preserve a very accurate chronology in all your teaching ; do not trouble the girls with minor, insignificant dates or events of only transient importance, but be sure that they know the landmarks and the setting and characteristics of each typical period as well as the most important dates.

(7) Use as many *forms* of illustration as possible (also expression work), maps, charts, illustrations, models, projects, notes (' A ' sections only), extracts, exercises, co-operative illustrations, visits, albums, dramatisation, friezes, etc., etc.

(8) Remember that good results follow only from keen interest in the work of both teacher and taught, and a full knowledge and thoroughly detailed preparation on the part of the teacher.

(9) In every oral lesson build up a systematic blackboard summary as the lesson proceeds ; use this at the end for revision, and, if desirable, as the basis of the record in the girls' notebooks (only ' A ' sections) ; *or* the girls might make their own digest of the lesson under the headings of the summary or expand fully the most important heading, etc., etc.

(10) ' A ' divisions only : Use the ' study ' method freely but be quite sure that work set is very definite, that it *can* be done from books supplied and that the results of the study are tested (preferably by written exercises). Avoid all laxity and haziness in ' study ' work and be quite sure that the teacher knows *beforehand*, in detail, the contents of the books placed in the hands of the class.

(11) With discretion the class may be divided into groups for studying one particular point each, to contribute towards a whole ; but this type of work requires very careful organisation and preparation on the part of the teacher to avoid waste of time and to make the study really effective.

' Teachers' chief work is to teach the children to teach themselves.' (Board of Education Suggestions.)

(12) Make as much use as possible of the literature dealing with the period—especially when dealing with social history (great personalities, vivid incidents). These give the atmosphere of the time far better than most modern illustrations can do.

(13) Essential facts *must* be learnt and constantly revised as well as important dates (dates of important kings and queens are quite useful landmarks). Study to be tested throughout the year by written exercises (sometimes short answers, sometimes cursive), also by discussions and debates. All this is particularly for ' A ' divisions. As a rule the best way of testing ' B ' pupils is by means either of short questions requiring very short definite answers *or* by asking for description of any one point in a paragraph.

Let *all* illustrate notebooks by sketches, cuttings, maps, etc., and unless there is

a definite reason (e.g. infection) for not doing so, let each girl keep her own history album throughout the school.

Use Time-charts very frequently ; these must be *visually* accurate as regards time.

' Who ? Where ? When ? and Why ? ' should be the keynotes to History Study.

(14) In ' A ' divisions note the importance of frequent and adequate oral lessons to prepare the way, to gather up threads, to supplement study, etc.

Scheme for ' A ' Division.

First Year.

1st Term.

Project : 'Britain and the Britons.'

(1) *Introduction*—to be dealt with generally.
- (*a*) The Old and New Stone Age—its people, habits and characteristics.
- (*b*) The Bronze and Iron Ages (in Britain specially).
- (*c*) The Oldest Civilisations—Babylonian—Egyptian (cf. Bible History) —Greek and Roman.
  The people—characteristics—reasons for renown. Traces of their civilisations to-day.

(2) *Britain as a province of the Roman Empire.*
- (*a*) Rome and the Roman Empire—its growth, extent, characteristics.
- (*b*) Britain as a Roman Province—advantages and disadvantages—traces of the Roman occupation seen in England to-day—camps, coins, roads, arches, buildings, etc., etc.
- (*c*) The Struggle of Christianity—its introduction into England.

2nd Term.

Project : 'Early England.'
- (*a*) The Recall of the Romans—followed by the English Invasions—results.
- (*b*) Influence of the English people—incentive given to Christianity by Pope Gregory and Augustine—general organisation of worship—building of churches, schools, monasteries.
  Architecture and Art of the period.
- (*c*) The coming of the Vikings—the growth of Wessex and English Nationality.

3rd Term.

Project : 'Norman England.'
- (*a*) The Norman Conquest ; organisation of feudalism and the consequent strengthening of the English Nation—centralisation of the Monarchy—effects on life—language, customs, architecture and status of England.
- (*b*) England and France.
- (*c*) Social conditions of the period—blending of various races—Domesday Book—agricultural conditions and the influence of the Manor.

N.B.—The two-fold aspect of feudalism—protection and service—effect in welding people into a national whole.

Second Year.

1st Term.

Project : 'Monastic Life in England.'

N.B.—All other work to be general and subsidiary.

(1) The State and the Church—relative power under the Normans and Plantagenets—conflicts and settlements.

(2) Monastic Life—its growth—importance and effects—description and plan of Monastery.
(3) Rise of Town Life—influence of Monasteries—trade and industry.

N.B.—England's European status under Henry II.

Note following points :

1. Rise of Parliament and Self-government—struggles and stages—Magna Carta.
2. Mohammedanism and England's part in the Crusades.
3. Life in the Middle Ages—the Friars—Universities—methods of justice—transit and trade under the later Plantagenets.
   Conquest of Ireland and Wales—attempted conquest of Scotland.
4. The Hundred Years' War—effects in England—Black Death and Peasants' Revolt—*n.b.* effect on monasteries.
   Decline of the power of the Church.
   Chaucer's England.
5. The Wars of the Roses and the dawn of modern England.

2nd Term.

Project : 'Tudor England.'

The Tudor Dynasty.

(*a*) The working and effects of Tudor Despotism following the Wars of the Roses—General Settlement effected by Henry VII—
   (*a*) abroad ; (*b*) in England.

(*b*) Rise of the New Nobility—effects and influences. Henry's methods of
   (i) administration ; (iii) finance ;
   (ii) dealing with impostors ; (iv) trade.

(*c*) The Renaissance—the fall of Constantinople—causes and effects on
   (i) learning ; (iv) trade, trade-routes, and
   (ii) the 'Arts' ; adventures.
   (iii) industry and invention ; (v) religion.

Teaching as far as possible to be centred round the Heroes of Learning, Art, Science, Invention, Exploration and Religion (English and Continental).

(*d*) The Reformation—a phase of the Renaissance—causes, leaders, progress and results.
   (i) in Europe ; (ii) in England.

Attitude of the successive Tudor sovereigns ; results of changes.

(*e*) Shakespeare's England—Elizabethan Drama. 1485 to 1603.

3rd Term.

Project : 'The Sea-Dogs of England.'

(1) Elizabeth's policy and methods
   (*a*) in England ; (*c*) in connection with Scotland.
   (*b*) in connection with Spain ;

(2) The beginnings of English naval supremacy.

(*N.B.*—Bull of Alexander VI Borgia and its effects.)

Advance in Ship Construction—dock construction, etc. ; impetus given to further naval adventure and exploit
   (*a*) by Renaissance theories ; (*b*) by Defeat of Armada.

(3) Tudor Heroes of the Sea.

N.B.—Great advance made in :

(*a*) Status of England as a political power.

(*b*) Methods of life in the country—dress, customs, pursuits, amusements, luxuries (*n.b.* sea voyages), architecture (domestic and national), adventure, etc.

(*c*) Trade and industry—exploration—methods and dangers in transit, etc.

Third Year.

1603—*Napoleonic Wars.*

1st Term.

Project : ' *Cavaliers* v. *Puritans.*'

Work to deal with the following points :

(1) Difficulties with which James I was confronted on his accession.

(*a*) In England—religious parties—plots, etc., *n.b.* effect on Empire Building—national religion—the Bible, etc.
Build lessons round the great adventurers where possible.

(*b*) In Ireland.

(*c*) In Europe—outbreak of the Thirty Years' War, etc.

(2) The Conflict between King and Parliament—causes and effects.

(*a*) Trace main steps in national representation and government : from Magna Carta to Tudor despotism—*n.b.* reasons why, although the people submitted to the Tudor despotism yet they would have none of Stuart despotism (changes in the succession—in the prosperity and life of the country—in the attitude of the people and their outlook and scope—in the form of the despotism—in the personalities and accumulated wealth of the monarchs).

(*b*) Conflict under James I—his difficulties—causes of the conflict—fatal results of the Hampton Court Conference—progress and effects of the struggle.

(*c*) The ' heritage ' of Charles I (*n.b.* particularly the ' personalities ' of each Tudor and Stuart monarch—has so much to do with the failure or success of each—make teaching as vividly pictorial as possible at all stages—see suggestions on the subject—this cannot be overdone).
The attitude of the people on his succession—difficulties confronting him augmented by his foreign alliance and its results—steps in the progress of the struggle leading to the attempted arrest of the Five Members and the outbreak of Civil War (only the decisive landmarks and essentials to be studied).
Group the teaching of the struggle as far as possible round the outstanding people of the time, e.g. Laud, Wentworth, Pride, Prince Rupert, Cromwell, etc.

(3) The Establishment of the Commonwealth—contrast Stuart despotism with Cromwell's despotism—causes of failure of the latter—Cromwell's conception of

(*a*) government and representation ; (*b*) empire.

Take these very simply but emphasise his new outlook (typical of the times) and his methods of trying to achieve his aims.

2nd Term.

Project : 'Stuart England.'

(1) The ' Glorious Revolution '—opposition in
(*a*) Scotland ; (*b*) Ireland ; (*c*) the Continent.

(2) The War of the Spanish Succession—causes and results. Marlborough and his achievements—the Treaty of Utrecht and its effects on Empire building.

(*N.B.*—In dealing with wars always treat them on quite general lines—never pursue battle after battle—deal with causes—scene of operations—main decisive episodes—results. Group all the teaching round the outstanding personalities.)

(3) England in Stuart Times.
(*a*) Religion.
(*b*) Conditions of life—dress—customs—amusements—houses, etc., etc.
(*c*) Adventures—enterprise and empire building.
(*d*) The Great Plague and Fire.

3rd Term.

Project : The ' Old Empire.'

(1) *Introduction.*

The Early Hanoverians (to be taken on quite general lines):

(*a*) Walpole and the beginnings of ' Cabinet ' Government.

(*N.B.*—Characteristics of the early Hanoverians and the opportunity these afforded for the development of the Cabinet form of government.)

(*b*) Continental affairs and the '45.

(2) William Pitt and the Seven Years' War :

(*a*) On the Continent—of little importance.
(*b*) In India
(*c*) In Canada } Vitally important in the History of the Empire.

(*N.B.*—Position of British Empire in India and Canada before and after the War.)

1763—the climax of the ' Old Empire.'

(3) George III and his ' Be-King ' policy—collapse of the ' Old Empire.'
Position of England as an Imperial power in 1783—Adam Smith's theories—lapse in Imperial policy.

(4) England in later Stuart and Early Hanoverian times—form of government—social conditions and customs—Wesley revival—agrarian and industrial revolutions—new methods of agriculture—industry—transit, etc.

(5) The French Revolution and the Napoleonic War (only to be introduced as starting point for next course).

Fourth Year.

' The 19th Century and After '—to be taken on very general lines, emphasising Social and Imperial Development.

1st Term.

Project : 'The Industrial and Agrarian Revolutions.'

(1) *Introductory.*

(*a*) The French Revolution and the Napoleonic War—causes and effects, particularly on England.

(*b*) The aftermath of the War (cf. Modern Times)—trade depression, etc.

(2) *The Agrarian and Industrial Revolutions*—revise details.

(*a*) Notice how war intervening for the time shelved but really increased the difficulties arising from these two movements (compare with the European War and the results of the highly mechanical age in which we are living and the consequent overproduction and lack of work, etc.). The rise of the factories—introduction of specialised labour—machinery, etc. (You cannot do better than read extracts from Adam Smith for these—they are very simple and very clearly stated, and help to emphasise the points to be made.)

(*b*) Scarcity of Work.

(*c*) Spread of vagrancy and crime.

(*d*) Necessity of new impetus in Imperial policy—the Convict Settlements, etc.

(*e*) Reforms of the 19th Century :

(i) Franchise and Legislation.
(ii) Poor Law.
(iii) Workers' Welfare—trade unions, etc.
(iv) Tariff.
(v) Science and Medicine.

2nd Term.

Project : The ' New Empire.'

(1) The ' New Empire '—exploration, extent, settlement, new methods of Imperial policy (*n.b.* ' Wakefield ' system, etc.) and government ; evolution of Colonial Self-government (on very general lines).

(2) The Empire To-day—' The British Commonwealth of Nations '—significance of title, etc.—extent—individual colonies, etc.

3rd Term.

Project : 'The 19th and 20th Century Inventions.'

(1) General inventions of the 19th and 20th Centuries.

(2) Trade of the late 19th and early 20th Century—position and rivalry of England—Germany—U.S.A.—Japan—China, etc.

(3) The Making of ' Modern Europe.'

(4) The great European War—causes and results—note inventions arising from the dire necessity of war.

(5) The Aftermath of War (cf. Napoleonic Wars).

(*a*) Poor Laws and Relief.
(*b*) Establishment of Labour Ministry and its work.
(*c*) Proposed Labour Camps ; etc.

(6) The ' New Empire ' and the ' League of Nations.'
The value and strength of Diplomacy and the dismal waste and devastation of War (*n.b.* loss of life—hardships, diseases, etc., during active period—ill-feeling—discontent—trade disorganisation and depression—poverty—struggle in aftermath—consequent artificiality of prices—conditions of life, etc.).

(7) The ' League of Nations '—its objects, powers, achievements, hopes and organisation.

N.B.—It may not be possible to cover all points in 3rd Term. Do what time permits and make a reasonable choice.

Geography.

I. *Aims.*

(1) To train an intelligent interest in the life, customs, etc., of the peoples of the world ; to give a general and detailed (where possible) knowledge and conception of the pupils' homeland, the countries beyond the seas and the world they live in.

(2) To give an accurate idea of the great regions of the world :

(*a*) Position and population
(*b*) Build
(*c*) Climate
(*d*) Productions—animal, vegetable and mineral
(*e*) Industries
(*f*) Communications and intercourse
(*g*) Internal and external trade
(*h*) Government and civic life

} of each region studied.

(3) Comparisons and contrasts should be drawn between countries wherever possible, e.g. between such populations as those of

(*a*) China ;
(*b*) England ;
(*c*) Switzerland ;
(*d*) Japan ; etc.

Differences and similarities in population are largely the results of geographical factors and conditions and these should be emphasised wherever possible.

(4) To give an accurate knowledge of the relative position of areas studied, means of reaching the same from the Homeland, etc., so that in after life pupils may be able to take a reasonable and intelligent interest in news from abroad, etc.

(5) To train the powers of reasoning (most important)—imagination and discrimination, visual imagery, etc. ; in ' B ' divisions, rely very much indeed on forming an accurate and typical ' visual ' image of any country or area studied.

(6) To give a general idea of the great natural phenomena and their influence.

(7) To train pupils in memory (including map-memory), study, construction, etc.

Notes from Board of Education Suggestions.

Older pupils should be able to draw *from memory, rapidly* and with fair accuracy, sketch maps to illustrate special points, and should be able (i) to fill in outline maps correctly ; (ii) to calculate distances from scale.

II. *Suggestions on Method.*

(1) In all teaching lead from ' cause ' to ' effect '—make work as deductive as possible ; do not teach unreasoned fact.

(2) Use every means available to awake, increase, as well as to maintain, the interest of the pupils ; e.g.,

(*a*) well-chosen, descriptive quotations from actual travels, poems, etc. ;
(*b*) pictures of all types—particularly coloured, typical pictures ;
(*c*) illustrations issued by P.M.G.—Colonial headquarters, etc. ;
(*d*) " Tourist " books and illustrations, etc., issued by shipping offices, railways, etc.—always available at fall of the year ;
(*e*) coloured illustrations made by class (co-operative work) or mistress ;
(*f*) all types of statistical diagrams of a pictorial type—must be bold and arresting ;
(*g*) models of all types to show
  (i) relief ;
  (ii) typical scenes ;
  (iii) typical costumes.

N.B.—Do not spoil the effect of good illustrations by having them

(i) too crowded ; or
(ii) too ' permanent ' (i.e. changed rarely).
(iii) arranged unmethodically.

Note the *different* means of keeping many and varied illustrations at hand and in sets easy to study.

It is a mistake to crowd one's walls indiscriminately for a whole term at a time.

(3) Do not weary of repeatedly applying ' world principles.' Fundamentals *must* be well grounded.

(4) *Lead and Train* girls to find out everything possible from map ; study on systematic lines (not by haphazard map-reading), also general book study, etc. ; but be careful to lead thoughts and study into definite channels by careful questioning, guidance, etc. Never let children grope in the dark.

(5) In any map drawn insist upon *one* line of latitude and *one* line of longitude *at least*, so that there may always be ' world localisation ' to give the keynote to any study. In vast areas, confine maps between *two* lines of longitude, to give an accurate idea of world position *and* extent.

(6) Keep weather charts, temperature charts, diagrams, maps, records of all kinds, albums, etc., and anything which aids in awakening interest in natural conditions (e.g. records of sun's altitude by means of a shadow pole in the playground ; or any other piece of practical work you can attempt).

(7) As much map-drawing as possible should be done by each class ; *but*

(*a*) do not let girls waste time drawing outlines ; supply these where possible ; otherwise let pupils trace outlines and fill in necessary details.[1]
(*b*) do not overcrowd maps—have purpose clear and unconfused.

(8) Train pupils in use of ' survey maps,' where suitable ; atlases (indexes of same, etc.) ; reference books available.

(9) Plan any useful visits, if possible, to encourage first-hand enquiry—surveying or map work.

Use home district to throw light upon any subject taught. Note also

(i) labelled goods in windows, etc. ;
(ii) current events ;
(iii) methods and routes of transit, etc. ;
(iv) details of ' current ' exploration and adventure ;
(v) literature of shipping companies, etc.

Much information *re* industries, etc., may be gleaned by girls by noting printing, etc., on motor traffic passing through ; commodities, source, destination, etc.

(10) Make special note of :

(*a*) Meridian of Greenwich.
(*b*) Calcutta (roughly 90 deg. E.).
(*c*) Date-line (180 deg.).
(*d*) New Orleans (90 deg. W.).

(11) In dealing with areas producing the same vegetable products, carefully note times of harvest and study possibility of a continuous supply throughout the year.

[1] (1) An outline cut-out used in connection with loose sheets is very useful and economical and can be used for any type of map. If loose sheets and cut-out are fastened by means of a paper-pin, a complete series is at hand for reference at any time on any special country or area.

(2) Marking any special features, e.g. industries, railways, etc., on tracing paper and superimposing same on a physical map.

(1) above has distinct and obvious advantages over (2).

(12) Try to express climate by range of temperature and amount and period of rainfall.

(13) It is not essential to follow any books in every detail—*plan* the work in conjunction with the book and let the book fit in with your plan ; use books freely (often teachers and pupils using them together) and be constant in emphasising and training map-study on ' cause and effect ' lines.

(14) See that each class masters ' world principles ' ; then study and deduce as much as possible from the map by questioning, etc. Attempt any exercises in text-books suggested and frequently set others of varying types.

(15) In every lesson make a very carefully planned blackboard summary of the chief sections and sub-sections of the subject matter taken ; let pupils supply the information by carefully graded questions. See that the summary is in good form. This summary may be used :

(i) to revise at the end of the lesson ;
(ii) as digest for notebooks ;
(iii) as skeleton for pupils to expand in notebooks.

Scheme for ' A ' Division.

First Year.

Scope.

All teaching to be on *general* lines ; at the end of the year girls should have a clear, general conception of the ' Old World.'

1st Term.

(1) Some fundamental geographical principles governing the subject.

(*a*) Wind systems and currents.
Rainfall, etc. (very simply and generally).
(*b*) Latitude and Longitude—Zones and Vegetation Belts—populations and industries—types of climate—maritime and continental.

N.B.—Geographical axiom—' Altitude compensates for latitude ' ; its meaning and significance, e.g. Switzerland.

(2) Eurasia—generally.

(*a*) World position and extent—relief (' Regional ').
(*b*) Climate and population—homes, habits, customs, etc.
(*c*) Productions—animal, vegetable and mineral.
(*d*) Industries.
(*e*) Trade, commodities and markets.
(*f*) Transportation and routes.

2nd Term.

The following ' regional ' divisions of the continent ' Eurasia '—treating each division on the lines (*a*) to (*f*) above.

(1) The Great Eurasian Plain. (*n.b.* (*a*) British Isles a part ;
(*b*) Trans-Siberian Railway.)
(2) The Mountain System of Europe and Asia (*n.b.* Trade Passes, etc., e.g. Khyber Pass, Simplon, St. Gothard).
(3) Mediterranean Region (*n.b.*, includes N. Africa).
(4) India, China and Japan.
(5) British Isles (most in detail).

(i) World Position as determining its pre-eminence :
(*a*) as a sea-power ; (*b*) as a commercial power.

(ii) Extent and population—important as affecting
  (*a*) its development as an industrial rather than an agricultural nation ;
  (*b*) its development as an Imperial power—importance of ' colonies ' as an outlet for surplus population, surplus products, etc., and as source of necessary supplies of raw materials, foods, etc.
(iii) General build—climate—productions—trade.

3rd Term.

(1) Africa—under headings (*a*) to (*f*) (page 517).
  (i) The Mediterranean Coasts (European and African) and the Nile Valley.
  (ii) The Sahara.
  (iii) Central Africa.
  (iv) The Peninsula.
  N.B.—The Cape to Cairo route.
(2) Australia and New Zealand, in broad outline only, on lines (*a*) to (*f*) (page 517).
(3) General Revision of Year's Work.

Second Year.

Scope.

At the end of the year the girls should have a clear, general conception of the whole of the New World and its international trade, internal trade, etc., treated on lines given in the syllabus and suggestions.

1st Term.

Revise ' world principles ' and emphasise these throughout the course constantly.

North America.

Outline of discovery, etc.

(1) Introduction.—Treat whole region generally (*a*) to (*f*) (page 517).
(2) The four great Natural Regions—each treated as (*a*) to (*f*) (page 517).
  (i) The frozen North.
  (ii) Eastern and Highland System. *N.B.*—Effect on early colonisation (cf. Cecil Sharp's ' findings ').
  (iii) The Great Central Plains.
  (iv) The Western Mountain System and the valleys between the ' Rockies ' and Coast Ranges.
(3) The great River Valleys.
  (*a*) St. Lawrence and the Great Lakes. (*b*) The Mississippi.
(4) The C.P.R., Airways, etc.

2nd Term.

South America.

(1) On same lines as above—generally, (*a*) to (*f*) (page 517).
(2) The main ' Natural Regions ' (*a*) to (*f*) (page 517).
(3) The Great Amazon Valley ; resources, etc.
(4) Revision of North and South America ; comparison and contrast where desirable.

3rd Term.

Central America and the West Indies.

(1) Treated generally, (*a*) to (*f*) (page 517).
(2) More detailed study of
  (*a*) Central America and Panama Canal (take the latter in fair detail).
  (*b*) The West Indies.
(3) General Revision of Year's Work.

Third Year.

Scope.

At the end of the year the girls should have a *detailed*, accurate knowledge of the British Isles and particularly England and her world trade.

Treat on lines suggested.

1st Term.

(1) British Isles—generally—treated as (*a*) to (*f*) (page 517).

(2) Further *detailed* study of

(*a*) Ireland } on lines (*a*) to (*f*)
(*b*) Scotland } „ „ „ „ } (page 517).

2nd Term.

Detailed study of England, on lines (*a*) to (*f*) (page 517).

3rd Term.

England's World Trade.

(1) Conditions in the Homeland necessitating and facilitating the development of England as a commercial country.

Her home industries—reasons for localisation and development of the same (*n.b.* change of 'localisation' and 'shifting' of centres—reasons for same—industrial revolution, etc.)—methods and conditions prevailing in the most important industries—regions of supply—ports—markets and routes.

(2) England's Near Neighbours—important products and intercourse—industries—routes and means of transit.

(3) England's overseas trade. Chief imports and exports—markets and routes (*n.b.* possibility of a continuous supply throughout the year of chief vegetable products (cf. 20 years ago))—means of securing same.

Fourth Year.

Scope.

At the end of the year the girls should have a *detailed*, accurate conception of the world, particularly of the British Empire and the great 'highways' of the world.

Treat on lines given in syllabus and suggestions.

1st Term.

(1) Geographical forces and their work (chosen in regard to work done in previous years).

(2) The Empire generally.

(3) The Great Self-governing Dominions and their place in the Empire—discussion of their form of government.

2nd Term.

(1) The Self-governing Dominions in greater detail.

(*a*) Canada and Newfoundland
(*b*) Australia and New Zealand
(*c*) South Africa
(*d*) India
} Revise on lines (*a*) to (*f*) (page 517).

(2) The peoples of the Empire—specially emphasising the conditions evolving from the presence of

(*a*) Colonists and their descendants.
(*b*) Native populations.

3rd Term.

The Great Highways of the World.

(1) The 'All-Red' Route (C.P.R.—its significance);

(2) The Panama Route;

(3) The Cape Route, and the Cape-to-Cairo Route;

(4) The Mediterranean Route (*n.b.* proposed Channel Tunnel for overland route to Marseilles) ;
(5) Trans-Siberian Railway ;
(6) Imperial Airways ;
taken in detail on following lines :
(*a*) Position—nature—course and extent of route.
(*b*) Times of ' passages,' etc.—advantages and disadvantages.
(*c*) Resources of routes, productions, industries and markets.

II.

Another set of syllabuses was received from a Non-Selective Central School for Girls, situated in Hull. In addition to giving the schemes of work in Geography, History, and Civics, this Head Mistress has tabulated the items in her own schemes which correspond to those given in the *Informative Content of Education* for Group C.

The schemes are reproduced in the following pages.

History.

Form 1.

1. Primitive Man—stages of advancing culture.
2. Mediterranean Civilisation in outline—influence of Mesopotamia.
3. Early Empires : Persian, Greek, Roman—Britain comes into History as a Roman province.
4. ' Barbarian ' attacks upon and settlements within the Roman Empire.
5. Spread of Christianity within the Roman Empire.
6. The Franks and their Empire.
7. Beginnings of the Feudal System.

Form 2.

1. Life in the Middle Ages :
   Feudal System. Chivalry. Pilgrimages.
   Growth of cities :
   Trade. Guilds. Fairs.
   Religion—common all over Europe—unifying influence—a great factor in everyday life.
   (*a*) Monasteries. (*b*) Churches. (*c*) Schools.
2. Beginning of Renaissance :
   Art. Literature. Religious Reform.

Form 3.

1. Renaissance :
   (*a*) Scientific discoveries.
   (*b*) Geographical.
   (*c*) Some political effects of Reformation :
   (i) Break-up of Spanish power.
   (ii) Rise of French power.
2. Colonial Rivalries in America.
3. Industrial Revolution in England.
   (*a*) Agricultural changes.
   (*b*) Manufacturing developments.
   (*c*) Transport.

Form 4.

Great social reforms arising from conditions created by Industrial Revolution :
a. Factory Regulations.
b. Associations of Workers.

c. Publicly provided Education.
d. Poor Law Reforms.
e. Public Health Service.
f. Extension of Franchise.

In October this class carries out a mock municipal election after two or three lessons explanatory of procedure.
Characters appointed to absorb the whole Form :

Candidates	at least two.
Candidates' Agents	one each.
Chairmen of Meetings	one each.
Supporters of Candidates	two each at least.
Stewards, Polling Clerks, Counters, Printers .	as required.

Brief accounts of work done are written out by each type of worker.

Form 4 (1938–39). *Modifications due to wireless course being taken : ' History in the Making.'*

1. Local Government.
2. Municipal Matters.
   (*a*) Election.
   (*b*) Council Meeting.
   (*c*) Committees :
      (i) Housing.
      (ii) Town Planning.
3. Wireless Lessons :

September to December.

a. Czecho-slovakia.
b. How to make Peace.
c. The World's Wheat Crop.
d. Holidays with Pay.
e. How far should we welcome Refugees ?
f. Local Government.
g. How Parliament Works.
h. Joint Stock Enterprise.
i. Buying and Selling in Africa.
j. History of Jews in Europe.
k. Raw Materials.

January to March.

a. The Highlands of Scotland.
b. Crime.
c. Roads and Railways.
d. National Service.
e. The I.R.A. Bomb Outrages.
f. The Mediterranean.
g. Election of the Pope.
h. Peopling the Empire.
i. The Real Frenchman.
j. The Budget.

4. Public Health.
5. Poor Law.

Form 4—Civics Course.

Introductory.

History introductory to the course covers general reforms of the 19th Century arising out of the industrial revolution :

(i) *The Poor Law.*
   a. Act of 1601.
   b. Act of 1662.
   c. Speenhamland Decision, 1795.
   d. Act of 1834.
   e. Local Government Act of 1929.
   Growth of Poor Law Movement as far as present-day Public Assistance Committees.

(ii) *National Insurance.*
- *a.* Persons and groups affected.
- *b.* Three types of benefit.
- *c.* Conditions.
- *d.* Differences between Public Assistance and National Insurance.
- *e.* Benefit for adolescents—credit or contributions for those who remain at school to 15 plus.

(iii) *Local Government Reform.*
- *a.* Municipal Corporations Reform Act, 1835.
- *b.* Acts of 1888 and 1894 creating County Councils and Urban District Councils.
- *c.* Development of Towns and their governments in 19th and 20th Centuries.

1. *Local Government.*
   (*a*) Central (Parliamentary Government).
   Differences.
   (*b*) Variety of Local Councils—duties—constitution :
   (i) County Council
   (ii) Urban District
   (iii) Rural District
   (iv) Borough
   } East Riding to provide illustrations.
   Hull considered as typical Town Council, but note that it is a County Borough.
   (*c*) Election of members of a corporation.
2. *Municipal Election.*
   (*a*) The Whole Form to ' man ' and carry out an election—Meetings to be advertised and held.
   Election by ballot on November 1st—the whole school to vote.
   (*b*) Election and investiture of Lord Mayor.
3. *First Council Meeting.*
   (*a*) Investiture of Lord Mayor.
   (*b*) Division into Committees :
   (i) Elected members (and aldermen).
   (ii) Co-opted members.
4. *Committees formed.*
   Education. Transport. Health.
   1938–39 Housing and Town Planning.
   Public Amenities.
   Cleansing and Sanitary.
5. *General Plan for Committee Work.*
   (*a*) Discussion of and notes upon duties.
   (*b*) Election of Chairman, and Secretary to keep Minutes.
   (*c*) Selection of topics for discussion—taken from current events.
   (*d*) Formation of Sub-Committees if desired.
   (*e*) Formulation of resolution for City Council.
   (i) General discussion all round subject.
   (ii) Analysis of points and concentration on one or two of the most important (at this point less desultory talking allowed).
   (iii) Formal moving and seconding a resolution.
   (iv) Discussion and vote.
6. Report to Town Clerk resolutions passed (this is instead of circulating minutes for City Council). These are discussed at next Council.

7. Brief history of each Committee to link this section of the work with the development of local government.

Geography.

General Plan of Treatment of Regions :

(1) Surface configuration and river basins.
(2) Climate—regular revision of determining conditions—prevailing winds.
(3) Productions determining distribution of occupations and industries.
  (*a*) Agricultural.
  (*b*) Mining.
  (*c*) Manufacturing.
(4) Commercial highways :
  (*a*) Great distributing centres.
  (*b*) Natural Highways.
  (*c*) Artificial Highways.

Comparison of the foregoing schemes in History and Geography from a Hull Central School (A) with the suggested *Informative Content of Education* (B).

(A)	(B)
History.	
Form 2. Life in Middle Ages. Crusades. Beginning of Renaissance.	Rise of Ottoman Empire.
Form 3. Some political effects of Reformation. Break-up of Spanish Power.	Rise and fall of Spanish Power.
Form 1. Break-up of Roman Republic. Break-up of Roman Empire.	
Form 2. Middle Ages. Trade, Guilds, Leagues. Discovery of new trade routes.	Increasing importance of economic changes in history.
Form 3. Industrial Revolution.	
N.B.—The above are examples when such changes are discussed, but the study of social history involves throughout the study of economic changes.	
Form 1. Mediterranean civilisation. Movement by sea, canal, road.	Communications and Trade.
Form 2. Growth of cities. Trade, Gilds, Hanseatic League.	
Form 3. Renaissance. Geographical discoveries. Colonial rivalries in N. America. Industrial Revolution.	Innovations in production and trade.
Form 1. Primitive Man : Age of World. Appearance of Man on the Earth.	General ideas of relation of oneself to universe.
Form 3. Renaissance ; Scientific discoveries.	
Form 1. Early Empires—Greek and Roman Myths.	Primary propositions of chief religious and philosophical interpretations of the world.
Form 3. Reformation.	

Forms V and IV listen to broadcast lessons—*History in the Making*—which refer to many points mentioned in Mr. Wells' scheme.

(A)	(B)
Geography.	
Whole world studied during school course, but not time for an explicit and detailed study.	Detailed and explicit acquaintance with world geography, with different types of population in the world and the developed and undeveloped resources of the Globe.
Form 1. The Earth—as planet—world climate and vegetation—types of people. Africa and Australia. *Form* 2. The Americas. Principles governing climate. *Form* 3. Europe and Asia. *Form* 4. British Isles. Local Geography. *Form* 5. Economic Geography ; world trade.	
Only studied on broadcast outlines. Usually occurs in syllabus as follows :	Geology of the world.
Form 1. Earth as a planet. *Forms* 1, 2, 3, 4. Mountain building, ancient and more recent mountains, work of ice. *Form* 4. Formation of coal, some land forms of British Isles, types of soil and effect on agriculture.	
This year *Forms* 5, 3 and 1 have had wireless talks on the relations between Man and Nature. These have been fitted in with present syllabus, and the uneconomic use of resources, etc., has been amplified in lessons dealing with regions studied in the separate Forms.	Devastation of World's forests, replacement of pasture by sand deserts through haphazard cultivation, waste and exhaustion of natural resources, coal, petrol, water, etc.

III.

In replying to last year's inquiry the head master of a Lowestoft Selective Central School, after indicating the sections of the suggested scheme which were taken in his own school, stated :

> ' It is perhaps fair to say that most of the remaining parts might be " advantageously included." Some of the phrases are rather staggering for a school curriculum, but they probably mean much less than they appear to mean.'

In forwarding copies of his schemes this year, he wrote :

> ' It would be too much to say that we do all that Mr. Wells thinks should be done, but I think that much of the work we are trying to do does square, in spirit at any rate, with many of the Wellsian suggestions.'

An examination of the information of the work in this school which he has supplied gives evidence of this fact.

This school has a full four years' course, and the pupils normally remain in attendance until at least the age of 15. Attention should, we think, be specially directed to the fourth-year course in History in which is included ' elementary economics—money, wealth, capital, banking and currency, labour, trade, etc.'

The syllabuses for Geography and History for the school are reproduced in the following pages.

History.

The Course.

In four years a complete chronological survey of the progress towards civilisation of the leading peoples of the world. From the beginning of the Christian Era,

attention is concentrated on the history of the British Isles, with due consideration given to those events abroad which influence affairs at home.

Aim.

To present an ordered and comprehensible account of this history. To encourage an appreciation of the value of the experiences of people of the past, and a power to analyse, reason, and compare. To demonstrate the essentials of citizenship, together with the order and meaning of elementary economic factors.

Method.

Teaching : study of each period to be

(*a*) political—dates, events, rulers, wars, legislation.
(*b*) social—housing, foods, clothes, working conditions, leisure hours, beliefs, etc., etc.
(*c*) economic—problems and conditions of government, money values, wages, trade, education, religion, etc.

By the Pupils :

In addition to work arranged by teacher, pupils to be encouraged and advised in private work such as

(1) Essays—lengthy, with largely own choice of subject, etc.
(2) Practical—construction of models, diagrams, drawings, paintings, dresses (speeches, also, to be given to class).
(3) Drawings largely suggested by teacher ; e.g. architectural series.
(4) Collections (and management of), foreign coins and stamps.
(5) Use of library—quite unlimited ; teacher's guidance ; ticketing system run by librarians.
(6) Discussion groups ; Project groups.
(7) Excursions to places of historical interest.
(8) Posting of pictures, newspaper cuttings, etc., by pupils.
(9) Attendance for special film displays, slide shows, etc.

History Course.

Year One.

From the Stone Age to the Norman Conquest.

(Egypt, Tigris and Euphrates Valleys, Persia, Palestine, Greece, Crete, Rome, Barbarians, Mohammed, Buddha, Britain.)

(Books : Marten & Carter, I ; Social Life, I ; Illustrated Books.)

Year Two.

The Norman Conquest to the Tudors.

(Special attention to Church power, architecture, guilds, work and wages, the plays, language changes, education, and printing, medicine, beliefs, housing, dress, food.)

(Books : Marten & Carter, II ; Social Life, I ; Source Books ; Illustrated Books.)

Year Three.

The Tudors to about 1789.

(Especially Reformation, Renaissance, Poor Laws, Agrarian and Industrial Revolutions, party politics, punishment and prisons, and all social factors.)

(Books : Marten & Carter, III ; Social Life, II ; Source Books ; Illustrated Books.)

Year Four.

Nineteenth and Twentieth Centuries. Taken as a whole, and in parts such as :

(1) History of Education ; of reforms in factories, and parliament ; of Trade Unionism and Co-operative movements ; of the Irish question ; of the remaking of Europe ; of colonial affairs and administration ; etc.

(2) Outline histories of prisons, shipping, telegraphs and telephones, conveyances, medicine, etc., etc. (complete surveys).

(3) Elementary economics—money, wealth, capital, banking and currency, labour, trade, etc.

(4) British Constitutional Method—local and central government systems ; voting, census taking ; taxation ; etc.

(5) Present-day affairs by wireless, and by discussions.

Geography.

General.

Introductory lessons for all classes are devoted to :—

The World as a sphere ;
Shape of the Globe ; Size, etc. ;
Latitude and Longitude ;
Climate, Zones, and Seasons ;
World Position, Climate and
Vegetation regions, relationships ;

with increasing detail and explanations from 1st- to 4th-year work ; such lessons to be largely revisionary and with particular reference to the Regional Study of each year.

First Year.

Regions of the World.

In the study of the Regions of the World, particular emphasis is placed upon :

(*a*) Form of life, occupations, homes, clothes, as controlled by geographical environment (soils, climate, and vegetation, etc.).

(*b*) The close relationships (racial, trade, etc.) and dependence of the Homeland upon the other Regions of the World.

(*c*) The development of the Human Race through the various stages of hunter, pastoralist, agriculturalist to industrialist, as illustrated by the study of the various forms of life, throughout the Regions of the World.

Second Year.

The British Isles.

Introductory lessons devoted to position of the British Isles with respect to :

(*a*) The World ;

(*b*) The continent of Europe, together with physical and historical connections thereto.

Throughout the year's work particular emphasis to be laid upon :

(*a*) Comparative geography, i.e. the lives of the inhabitants of other parts of the British Isles as compared with our own, with reference to causes for such differences and contrasts.

(*b*) The relation between the various Human Regions and other parts of the Empire and the World :

e.g. Our dependence on imported food supplies and raw materials, and exports of manufactured articles.

(*c*) The varied scenery of the British Isles as related to rock structure, together with types of houses and buildings as controlled by the available building material (based on pictures in Railway Holiday Guides).

Third Year.

The Atlantic Hemisphere.

(a) *Girls' Classes :* In the study of the vegetation regions the topics are closely related with the Natural Science lessons.

Particular emphasis is placed upon the peoples—both native and immigrant—of the regions to be studied in relation to clothing, customs and habits.

(b) *Boys' Classes :* In the study of climate regions the topics are correlated with the Science lessons.

Particular emphasis is placed upon Rock Structure and Relief in relation to vegetation and crop production.

Diagrammatic sketch maps, which stress relationship between Distribution of Population and Occupations in relation to Climate and Vegetation, are introduced at this stage.

The spread and influence of European civilisation into and throughout other regions of the world are considered in relation to the development of agricultural and pastoral regions of Africa and the Americas as complementary to industrial Europe.

This year's work provided opportunity also for the following topics to be touched upon as the occasion arises :

(1) Historical development and exploration of the British Empire.
(Continued also in the 4th-year work in the study of Asia and Australasia.)
(2) Great land, sea and air routes as links between the Homeland and the continents of the Atlantic Hemisphere.

Fourth Year.

Euro-Asia.

In the study of *Asia* particular reference will be made to the contrasts between Eastern and Western civilisations as related to geographical environment and racial differences. Emphasis will also be placed upon the Changing East in relation to the influences of Western civilisation upon India, China and Japan, and such topics as the following will be discussed :

(*a*) The Indian Empire and Dominion status.
(*b*) The Yellow Peril both as a population and a trade question.
(*c*) Japan as the Britain of the East.
(*d*) Japan *versus* America in the Pacific.
(*e*) Irrigation in relation to agriculture in India.

Australasia to be largely treated as a region of the world passing rapidly through all stages of human development, from pastoral through agricultural to the industrial.

Special topics to be considered :

(1) Imperial Preference in Trade and Defence ;
(2) New Zealand as the Britain of the South ;
(3) Imperial Airways Development ;
(4) Discovery and Exploration of Australasia ;
(5) Fruit Regions of Australia in relation to S.W. Africa, the Mediterranean lands and Home Trade ;
(6) Native Populations of Australia and New Zealand—Coral and Earthquakes and Volcanoes.

Europe : The study of the geography of the countries of Europe will be largely considered in its relation to :

(*a*) Trade with the United Kingdom and the neighbouring countries ;
(*b*) Tendencies towards the development of nationalities based on language and race ;
(*c*) Industrialisation based on the development of hydro-electric power or co-operative farming (as in Denmark) as a means to economic independence ;
(*d*) Varied post-war political and economic experiments ;
(*e*) The League of Nations and its economic work.

Revision of the *British Isles* in its world setting, with particular reference to post-war changes of—

(*a*) Overseas and home trade ;
(*b*) Industries and Electric Power ;
(*c*) Distribution of Industries and new developments.

Local Geography.

Throughout the four years' course, *Local Geography* will be introduced into each year's work whenever the topic under discussion can be related to local geographical conditions.

Map-work.

Mapping of positions of school, home, landmarks, etc., as related to relief based on actual knowledge of

(*a*) direction of main roads ;
(*b*) higher positions and low-lying regions of the locality ;
(*c*) coastal cliffs and beaches.

Localisation of industries as related to road, railway and river transport, harbour facilities and relation to fishing grounds of the North Sea.

Mapping of sea roads as related to distribution of sandbanks. (See Nautical Almanac and Coastal Charts.)

Study based upon :

(*a*) Papier-mâché Contour Map of Lowestoft—Industries.
Constructed by Form VI Boys, April 1934.
(*b*) Ordnance Survey Maps (Geological and Land Utilisation).

First Year.

Regions of the World.

The following topics will be considered with particular reference to either the Lowestoft Region or East Anglia as a whole :

(1) Wheatlands of the World as compared with the Wheatlands of Eastern England—intensive farming and crop rotation—agricultural villages and market towns as compared with the Prairies and Pampas, with collecting and exporting centres.

(2) Sugar production—Sugar-cane of tropical regions as compared with Sugar Beet of Temperate Regions (Norfolk—Cantley factory).

(3) Cattle Ranching of Pampas as compared with stock-raising on the marsh lands of the Fens and Suffolk and the Dairy Farming of Essex and lowlands of the West.

(4) The North Sea and Fishing with particular reference to :

(*a*) Lowestoft Trawling Industry.
(*b*) The East Anglian Herring Fishery.
(*c*) Pickling and Curing Trades.
(*d*) Fish-canning Industry (C.W.S. Factory).

Relation between the Fishing Industry and British Shipping, Naval Power, Trade Routes and the Empire.

In the study of all Regions of the World, emphasis to be placed on comparisons and contrasts with the Home Region wherever possible.

Second Year.

The British Isles.

This year's work will allow for a more detailed study of Lowestoft and Region along the following lines :

(*a*) The Fishing Industry—as in the last year's work—together with further study of habits of fish, methods of curing, and home and export trade. (Klondyking.)

(*b*) The East Coast Holiday Resorts (Drier side of England) compared with other Holiday Regions (Lake District, North Wales, South Coast, etc.). Climate *versus* Scenic Attractions in relation to Rock Structure.

(*c*) Lowestoft as a Trade Port—Timber, coal imports, etc.

(*d*) Lowestoft as an industrial centre—Canning, Ice, Marine motors and Ship-building.

(*e*) Coast Formation in relation to rock structure, with particular reference to Coastal Erosion and the Coastal Defences (as devised by the Borough Surveyor).

(*f*) Lowestoft's water and electric power supplies.

(*g*) Lowestoft and the Broads.

Third Year.

Throughout the year's work, reference to, and comparison with, the Lowestoft Region will be made wherever possible ; e.g. :

(*a*) Beach formations and sand-dunes (work of sea and wind) compared with the sand of the deserts.

(*b*) Wheat and crops rotation compared with wheat farming on the Prairies of Canada.

(*c*) Fishing industry compared with

(i) Cod Fisheries of Newfoundland ;

(ii) Salmon Fisheries of British Columbia ; etc.

Fourth and Fifth Years.

The topics given under 'Second Year' will also be taken during the 4th and 5th years' work, forming the basis of individual research work in the preparation of Essays dealing with the geography of the Lowestoft Region.

SUPPLEMENTARY GEOGRAPHY.

The Geography lessons will be supplemented whenever possible by :

(1) The Daily Press and Newspaper Supplements (*The Times* and *Telegraph*). *The Times Trade and Engineering Supplement.*

(2) *The Geographical Magazine.*

(3) The B.B.C. Geography Lessons (when time-table permits).

(4) Film Displays (35 mm.). Films borrowed from the G.P.O. Film Library. (Evening Displays—voluntary attendance.)

(5) Epidiascope displays using holiday snaps and picture postcards or pictures collected by the pupils. (Holiday Guides.)

(6) *Group and Project Work : 1st and 2nd Years :*

The classes will be divided into groups to be engaged in the compiling of Pictorial Maps to illustrate geographical distributions, e.g. the Peoples and Occupations, the Scenery, the Crops, the Animals, etc., of the region under study.

Group and Project Work : 3rd Year :

The construction of Flow-Charts for various industries based on the year's regional study : e.g. :

The Cotton Industry ;	Rubber Production ;
The Manufacture of Paper ;	The Herring Industry ;
The Manufacture of Soap ;	etc.

The work to be done largely in the form of maps, illustrations, and sectional diagrams with a minimum of writing. Each boy to give a short talk on his own section of the chart. Details of industries to be obtained (if possible) direct from the manufacturers.

Group and Project Work : 4th Year :

Essay on the Lowestoft Region to be compiled with the aid of maps, graphs of statistics (trade, passenger traffic, etc.), based on the East Suffolk Regional Development Plan, and Model Relief Map of Lowestoft constructed by Form VIB, April 1934.

IV. Modern Language Teaching.

In the preceding inquiry there was no reference to the contribution which may be made by Modern Language Teaching to the Informative Content of Education. A member of the Committee has pointed out that ' modern methods of Modern Language teaching, conceiving their subject as essentially *living* and a medium of *people*, have a considerable informative contribution which is not necessarily accounted for under other headings.' Since a second language is often begun at about the age of 11 plus, some reference should perhaps be made to this contribution.

In the classroom where modern language is taught, a good first-year course includes familiarisation with the following facts about France and the French :

Frontiers ; Four chief rivers ; Seven chief towns ; Two chief mountain ranges ; Colonies.
Agriculture : Wheat and Vines.
Industries : Silk ; Iron and Steel ; luxury goods.
Money.
Paris : more details.
System of government.
National Fête ; National Anthem.
Departments and Provinces.
Diet.
Family life.
The story of Joan of Arc.

In the following years similar treatment is extended to cover *education ; customs ; sports ; methods of transport ; outstanding personalities in literature, art and science.* The treatment of these details is very simple and elementary, but this amount of information is definitely learnt by many who begin a foreign language at 11 plus. The three stages (to continue with reference to French alone) provided by the B.B.C. under the headings ' Early Stages in French,' ' Intermediate French,' and ' French for VIth Forms,' strongly support this aspect of the teaching in their weekly lesson, which also includes songs and games. ' Early Stages ' are taken regularly by 1,135 schools, ' Intermediate French ' by 565, and the senior course by 710. The Early Stages in German are taken by 348, and German for Vth and VIth Forms by 453 schools.

Outside the classroom good Modern Language teaching includes a many-sided Modern Language Society which will arrange, among other things, for visits to

cinemas, theatres and art galleries. The Modern Language Association has 1,250 slides of French life, which are lent to schools for use by such societies, which also sometimes arrange conferences to show the working of bodies such as the International Labour Organisation. Correspondence between individuals or between classes or between whole schools, international exchanges, school journeys and international camps, all of which are usually organised in connection with language teaching, contribute to the informative content of education.

V. General Observations on Senior School Schemes.

The Committee would have preferred to have had before them a larger number of schemes and to have been able to make a more detailed comparison. This, however, was found impossible. The syllabuses reproduced in the foregoing pages are therefore presented as specimens which have been submitted by head teachers who had previously given evidence of interest in the Committee's inquiry. The Committee would also have preferred to have schemes of work giving evidence of opportunities afforded to the same pupils by successive junior and senior courses. Unfortunately these were not available, and the schemes for senior schools had therefore to be considered quite separately.

These syllabuses, however, do provide sufficient material to illustrate the methods of approach to the subjects and to indicate the wide scope of the work attempted. Regarding both of these features of the schemes there will certainly be differences of opinion. Severe adverse criticism of the geographical syllabuses has for example been expressed by a University Lecturer in Methods of Geography Teaching. 'In Geography,' he said, 'the method is *not* to work from cause to effect. Much Geography can be understood without reasons (in the scientific sense).' He objected to references to 'World fundamental principles.' 'To begin with these,' in his opinion, 'is all wrong. World principles surely come at the end of the course. Thus all syllabuses which want to start with geography principles are useless.' In passing he expressed objection to a statement from the Spens Committee Report wherein the idea of 'well-grounded principles' is mentioned.

The Spens Committee, however, were concerned with the curriculum of secondary schools; and the pupils in these schools, like those for whom the schemes under consideration were formulated, have already been in school at least five years. During that period some geography will have been taken, and the question arises whether all courses, regardless of the age of the pupils for whom they are planned, should start from the same point or whether those responsible for syllabuses should have regard to instruction and training previously given.

In the opinion of this critic, 'the idea of geography is wrong in much of this Report. There aren't,' he adds, 'any geographic "forces" compelling human beings. At the best the physical phenomena only *influence* men over a wide range of possible choices of occupation.' This, of course, raises the old question as to the interaction between environment and personality. But it would be interesting to know whether this critic would admit that man may be so strongly influenced as to be compelled to take certain lines of action in order to use his environment most advantageously. Why, for example, are some Eskimo nomads?

Other critics focussed attention upon the prominent place given to, and the time obviously occupied by, the study of Britain and the British Commonwealth. Again the likelihood of divergencies of opinion will be apparent, whether the subject under discussion be Geography or History.

The Committee decided, therefore, not to concern themselves unduly with criticism of details, but to offer the following general observations.

Whether the subject studied be Geography or History—and in passing it should be noted that these subjects cannot be adequately studied if they are presented in

isolation or if they are taught as wholly separate and distinct branches of knowledge —the proper presentation of the facts concerning the place and importance of Britain and the British Commonwealth requires that these be seen in right perspective both in relation to time and space. They cannot thus be portrayed without bringing in the outside world and without due regard being paid to the march of time. These facts have received a measure of recognition during recent years. (For example, much more can be taught of Russia in State schools to-day without arousing opposition in certain quarters than could have been attempted even twelve months ago.) But as yet they have not been allowed to exercise sufficient influence in the formulation of schemes of instruction. By focussing attention upon the needs created by a recognition of these facts, and by suggesting modifications in the scope of the syllabuses of instruction and in the emphasis to be given to various sections of subjects taught, Mr. Wells rendered a useful service to the general public, and especially to teachers and other educationists.

But to discern these needs, however clearly, is not enough. Even to stimulate a strong desire to satisfy them may not be sufficient, unless steps are taken to gratify the demand of teachers for facilities to obtain new information and for opportunities to integrate their knowledge. Teachers in active service are perhaps more conscious than anyone else of their difficulties in these directions. When they are compelled, as they are, to engage in actual teaching for five and a half hours each day—for even in the best-staffed of these schools free periods are few, and in many they are quite unknown—and when in addition they have to spend time each evening in marking written exercises, the opportunities for gaining new knowledge cannot but be inadequate. With the rapid growth of knowledge the need for the teacher to continue to be well informed is of the utmost importance if he is to be saved from becoming a ' retarding shadow ' upon the youth of the country. . Teachers are fully conscious of this fact. Many of them, despite the handicaps imposed by the conditions of their service, endeavour to gain up-to-date information and to take an active and intelligent interest in what is happening in the world ; their attendance at Refresher Courses in thousands each year is evidence of this fact. Some of them devote to this task so large a proportion of their leisure time that they run a risk of segregating themselves from other members of the community and becoming a class apart. Such a possibility cannot be contemplated with equanimity, since it constitutes a threat to them as teachers and citizens at least as dangerous as out-of-date equipment in the sphere of knowledge does to their professional efficiency. Much more should, therefore, be done to afford facilities for teachers to gain up-to-date information and for them to integrate the whole of their knowledge so that it can be used to interpret everyday events and to discover purpose.

Something is already attempted in this direction for teachers in State schools. Limited opportunities are available for attendance at certain types of Refresher Courses arranged by the Board of Education, and associations of teachers are organising for their members similar facilities, though of shorter duration, with increasing frequency. But much more is urgently necessary. The opportunity for teachers to obtain what may be described as ' daily sustenance ' should be regarded as an essential condition of the teaching service. Time for this should be afforded, and the beneficial employment of that time should become a part of the ordinary routine of professional life.

But even this will not be enough. At regular intervals there should be afforded adequate Refresher Courses of longer duration. The ' Sabbatical Year ' for every teacher should be regarded not as an impracticable ideal but as a first necessity if teachers are efficiently to perform their duties and to remain alive and alert throughout their careers. But this implies the organisation of courses on modern lines, in respect to which something more may be necessary as part of the normal training of teachers. Both Elementary and Secondary schools will inevitably lag

somewhat behind the Universities. Whether trained in Training Colleges, where the staff are University graduates, or at Universities themselves, the initial equipment of teachers will be largely determined by the instruction afforded by the professors and tutors and the attitude adopted by them to new knowledge. If, therefore, in the Universities there is a time-lag, that lag will be intensified in the schools. This aspect of teacher-training merits more consideration than appears to have been given to it hitherto. It certainly gives emphasis to the need for Refresher Courses.

But possibly a further observation should be offered in relation to these. They should be real Refresher Courses and not merely gatherings at which tired tutors are expected to deliver at the end of term lectures, in more or less modified form, which have been prepared for other occasions. They must be times of refreshment, not simply a series of meetings for listeners. They will necessarily afford opportunities to acquire new facts, but, whether these be few or many, the course will not serve its true purpose if the acquisition of facts be the only result. A Refresher Course of the type envisaged will do much more : it will assist the teacher to acquire a sense of purpose and validity and enable him to see his work against the background of the changing world. He will then be able on return to school to assist his pupils to become broadminded, helpful, generous-spirited, capable, and, as far as circumstances of the school allow, technically equipped.

SECONDARY SCHOOLS.

The Committee had before them the relevant sections of the Spens Committee's Report on the Curriculum of Secondary Schools and gave some consideration thereto. They were of the opinion, however, that this aspect of their inquiry demanded much more information and would require far more time than was available this year. They therefore decided to ask to be allowed to continue the work during the coming year. If this request is granted it will be possible to study in greater detail both the conclusions of the Spens Committee and the informative content of the curricula at present in use in secondary schools.

RESEARCH IN EDUCATION

REPORT of the COMMITTEE appointed to consider and report on the possibilities of organising and developing research in education (Prof. F. CLARKE, Chairman ; Mr. A. GRAY JONES, Secretary ; Miss D. BAILEY, Mr. J. COMPTON, Dr. EVAN DAVIES, Mr. E. SALTER DAVIES, Dr. S. GURNEY-DIXON, Dr. M. M. LEWIS, Sir RICHARD LIVINGSTONE, Mr. P. B. H. LYON, Prof. R. A. C. OLIVER, Mr. C. A. RICHARDSON,[1] Mr. W. H. ROBINSON, Mr. N. F. SHEPPARD).

CONTENTS.

1. Introduction.
2. A brief historical sketch.
3. The present position of Educational Research in England and Wales.
4. Suggestions for Organising and Developing Research.
5. Recommendations and Conclusions.

1. INTRODUCTION.

THE Committee was appointed by the Council of the British Association at the request of Section L (Educational Science) in view of the special interest taken by

[1] Mr. C. A. Richardson attended on behalf of the Board of Education but did not vote in the proceedings nor is he a signatory to the report.

the Section in the general question of educational research in this country. The terms of reference are explicit ; they empower the Committee to enquire into the possibilities of organising and developing educational research. The Committee was neither requested to initiate such research nor to examine critically the quality of such research as has been or is being undertaken. Accordingly the Committee's work involved two stages.

(*a*) It was necessary first to survey briefly the nature and extent of educational research in England and Wales ;

(*b*) When this survey had been completed the Committee proceeded to consider proposals for such further organisation and development of educational research as seemed in their view to be both practicable and desirable.

The meaning of the term ' educational research.'—The Committee have throughout used the term ' educational research ' in its widest sense. They hold that it should not be confined to highly specialised academic studies such as are not always capable of application in the classroom or in a wider professional field. It should include not only formal investigations such as inquiries into examinations, intelligence tests and studies of mental factors, but also experiments and inquiries about such matters as the curriculum and organisation of schools, and their equipment.

On the other hand there is a limit to the width of this definition. True research involves careful systematic and thorough investigation with a view to ascertaining objectively the answer to a question or questions that have sufficient intrinsic importance to warrant investigation. This is the limiting criterion that the Committee have applied.

2. A Brief Historical Sketch.

A survey of the amount of educational research completed or proceeding in England and Wales reveals the fact that such research as has been conducted has been neither adequately registered nor effectively co-ordinated. Its results have generally not been made available in such form as to influence readily administrators, teachers, and the public. Moreover, there are large and important areas of investigation that still remain to be explored.

The need has long been felt for some organisation to co-ordinate and stimulate research and to direct inquiries into new developments of education. Such organisations already exist in America (e.g. the International Institute of Teachers College, Columbia University) ; there is an International Bureau of Education at Geneva and there are Educational Research Councils in Scotland, South Africa, Australia, New Zealand and Canada.

In this country attempts have been made in recent years to found similar bodies. The British Psychological Society established in 1922 a *Committee of Educational Research.* That scheme proposed a small executive committee in London with a secretary, together with a larger advisory body comprising Professors of Education and of Psychology in British Universities, together with other persons qualified to assist in educational research. The Committee's function was not to prosecute research but to register, co-ordinate, facilitate co-operation, to guide young workers and to foster desirable inquiries. Although the Committee published accounts of work in progress, the scheme did not come to fruition and the Committee ceased to function in 1935.

Its duties were then taken over by the Education Section of the British Psychological Society and the latter's Committee on Human Mental Measurements. The British Journal of Education Psychology continues to record summaries of research into mental abilities, including published and unpublished theses submitted for higher degrees.

The Workers Educational Association attempted in 1928 to found a *Bureau of*

Educational Research and Information whose services would be available to the W.E.A. and to subscribing bodies, but the financial difficulties proved insuperable.

In 1933 the Royal Society of Teachers (formerly the Teachers Registration Council) convened a series of conferences with a view to setting up an organisation independent of the Society which would organise and develop research. A Committee was formed representative of the Universities and teachers' associations to establish a suitable organisation, and the *Educational Research Council* was formally established in 1935. Its aim was defined as follows :—

> ' to encourage and foster research in all branches of education and to co-ordinate the collection and publication of results.'

Difficulties of finance and organisation terminated the existence of the Council in June 1937 before it had been able to attempt any effective work.

The present Committee was sanctioned by the General Committee of the British Association in November 1938 and held its first meeting on February 9, 1939. Six meetings have been held.

3. The Present Position of Educational Research in England and Wales.

The Committee were impressed at the outset by the fact that no adequate survey had yet been made of the extent and nature of educational research and inquiry in this country.

As a preliminary it was resolved to address a suitably worded questionnaire [2] to the following :—

1. Local Education Authorities ;
2. University Education Departments and Teachers' Training Colleges ;
3. Educational Societies and organisations ;
4. Teachers' Associations.

In addition information was sought from the Board of Education,[3] and from individual workers who have engaged in research.

The Committee recognise that an elaborate and detailed survey was not possible in the time available and without the services of a full-time investigator. Nevertheless they are satisfied that the information procured has proved adequate for the immediate purpose and has enabled them, through the willing co-operation of the above-mentioned bodies, to complete a survey which they believe to be more comprehensive than any which has been hitherto attempted in this country.

(i) The Local Education Authorities.

The questionnaire was sent to each of the 315 Local Education Authorities in England and Wales. Replies were received from 120 (26 counties, 36 county boroughs, 58 boroughs and urban districts (Part III, L.E.A.'s)).

The reply was a *nil* return in 81 cases (16 counties, 19 county boroughs, 46 Part III). The remainder (10 counties, 17 county boroughs and 12 Part III) fairly represents the minimum number of authorities under whose auspices some form of educational research or inquiry of wider rather than local interest has been conducted in recent years. But 39 out of 315 is a notably small minority. If it is asked why the figure is not larger, one explanation is that many of the 170 Part III Authorities are too small to undertake anything beyond routine work. Again, in the case of the larger

[2] See Appendix.

[3] Whose interest in the Committee's work was shewn by their appointment of Mr. C. A. Richardson, H.M.I., to attend its meetings. The Welsh Department of the Board through their Permanent Secretary and Chief Inspector desired to be kept fully informed of the Committee's proceedings.

authorities, unless the Education Officer is particularly interested in research or inquiry, he is usually too busy to spare the time to encourage or develop it. If he is interested, however busy he may be, he manages somehow to find the time.

Of the 81 *nil* returns, 39 favoured the creation of a national organisation for the more systematic pursuit of research, 3 were doubtful, 38 expressed no opinion.[4] Only 1 was definitely against the proposal (on the grounds that ' the existing machinery seems adequate for the purpose of any inquiry '). One opinion emphatically for a national organisation was to the effect that ' such a body could allocate which objects of research could appropriately be carried out by the local authorities and by the Universities.' A similar opinion stressed the value of such an organisation ' in the pursuit of inquiries into

(*a*) examinations,
(*b*) intelligence tests,
(*c*) the value or otherwise of Special Schools for Mentally Defective Children.'

Of the 39 local authorities reporting some form of research, 10 were counties, 17 county boroughs, and 12 boroughs or urban district councils. An analysis of the returns shews that those from two counties merely reported participation in the Land Utilisation Survey. In 3 boroughs and 1 urban district the inquiries or research were of limited extent (use of leisure, intelligence tests at one school, use of wireless and examining for special place examinations).

In the remaining 33 the inquiries varied considerably in character and extent, but deserve definitely to be regarded as research. The research falls into three main classes :—

(*a*) psychological, including tests of attainment of intelligence and vocational guidance ;
(*b*) educational, e.g. examinations, curriculum, bilingualism,
(*c*) medical, including nutrition.

The research was carried out by the L.E.A. in 21 cases and jointly with other agencies in 12 cases, in 9 of which financial support was given by the authority and in 3 cases by the co-operating organisation.

Of these 39 L.E.A.'s, 25 (7 counties, 11 county boroughs and 7 Part III authorities) favoured the creation of a national organisation for research, 11 (2 counties, 5 boroughs and 4 Part III authorities) expressed no opinion, 2 were doubtful and 1 (a borough) was against the proposal.

General observations.—Considerations of time and space prevent the submission of a full list of the researches or inquiries reported, but a brief specimen list is given below. It would be undesirable to draw any comparisons between L.E.A.'s in respect of the research undertaken. Estimates of its value are not called for here nor could any such estimates be justified without prolonged investigation beforehand. But it may be confidently asserted that in at least some dozen cases the work completed is of such value as to warrant publication outside the Authority's area. One cannot read some of the reports without first paying tribute to the time and energy so effectively and spontaneously expended, and next reflecting on the need for some central body to co-ordinate such research and inquiries, to make their results more widely known, to offer suggestions for further investigations, and to prevent overlapping and the repetition of inquiries already successfully completed. This point cannot be better emphasised than by quoting the reply from a large county borough, whose research (not listed here) is of outstanding quality :—

[4] Nine counties, 7 county boroughs and 23 Part III authorities supported the proposal. Seven counties, 9 county boroughs and 22 Part III authorities expressed no opinion.

'There is need for a "sorting house" where the outcome of researches made by the L.E.A.'s can be assessed with respect to their national value. The outcome of these researches of national importance could then be made known generally. From such a source too there could come suggestions as to the investigations that wait to be carried out.'

Specimens of the inquiries conducted under the auspices of Local Education Authorities.

Counties :

A. The Technique of Vocational Guidance for Juveniles. (In conjunction with N.I.I.P. Financial support from the L.E.A.)

B. An examination of the operation of the Secondary School Entrance Examination for the period 1933–38. (By the L.E.A.)

C. The extent of backwardness or retardation among the children of 10–12 years in public elementary schools in a county area. (In conjunction with N.I.I.P. and a panel of teachers trained in the Binet-Simon tests. Financial support from L.E.A.)

D. (*a*) Weight, Height and Nutrition.
(*b*) Dietary Investigation.
(*c*) Dietary and Nutrition.
(*d*) Hearing (Audiometer testing).
(By L.E.A. in co-operation with Ministry of Health, Carnegie U.K. Trust and Revitt Research Institute and Medical Research Council.)

County Boroughs :

E. Selection of skilled Apprentices for Engineering Trade.
The value of Vocational Tests.
(By L.E.A.)

F. (*a*) Enquiries (4) into Standardised Tests and their application.
(*b*) Investigation and Report on the dull backward and maladjusted child.
(By L.E.A.)
(i) In co-operation with Edinburgh University.
(ii) In co-operation with Central Association for Mental Welfare.
(Financial support from L.E.A.)

G. (*a*) The mentality of a cross section of the school population.
(*b*) Heart Disease in Childhood.
(Both without financial support from L.E.A. (*a*) By Burden Mental Research Trust, (*b*) Bristol University.)

H. High temperature radiant heating of schools. By L.E.A. in conjunction with N.I.I.P. The cost was first met by L.E.A. and later by Electrical Development Association and a firm of electrical engineers.

Boroughs and Urban District Councils. Part III Authorities :

I. (*a*) Discipline and freedom.
Transfer examinations.
Skills and activities.
(*b*) Survey of schools with regard to intelligence and schools.
((i) By local branch of N.E.F. ; (ii) by the L.E.A.'s psychologists.)

J. (*a*) A sickness absence survey.
(*b*) An experiment in nutrition.
(*c*) Effects of temperature and ventilation on mental output and fatigue.
(*d*) Artificial lighting.
(L.E.A. in conjunction with N.I.I.P. with financial support in one case.)

K. (*a*) Children's Verse.
(*b*) Survey of school buildings, equipment and furniture.
(*c*) A six months' investigation by an educational psychologist.
(By L.E.A. In (*c*) with help of Central Association for Mental Welfare.)

L. Mental Surveys.
Classification in Senior Schools.
Methods of Selection for Secondary Schools.
Blackboards.
(By L.E.A.)

Note.—This is only a specimen list; several L.E.A.'s have published valuable reports of inquiries into such matters as, e.g., school broadcasting and vocational guidance.

(ii) Universities and Training Colleges.

(*a*) *University Education Departments.*—The questionnaire was sent to 21 University Education Departments; replies were received from 10; of these, 9 supported the formation of a central organisation for research, 1 expressed no opinion.

As might be expected, there is a considerable amount of research undertaken in connection with the university education departments. It falls into two main divisions :—

(*a*) Research carried on by members of the staff.
(*b*) Research prosecuted by graduates supplicating for higher degrees (e.g. M.A., M.Ed., or Ph.D.).

In three cases lists of published work have been supplied; in other cases lists are available when required. To list and classify this research here is not practicable, but some general observations can be made as to its variety and extent. Selections from a specimen list are subjoined :—

Research carried out at a Northern University.

1936 *Lady Barn House and the work of W. H. Herford.*
Fabrics and their decoration. Decorated textiles from Yunnan.
The Co-ordination of Law and Administration.
The Educational Film and Modern Studies.
Critical notice of 'An Examination of Examinations.'
The use of Hearing Aids in the Treatment of Defects of Hearing in Children.

1937 *Experiment in Education.*
German Education: a retrospect and reassessment.
Modern Language Teaching on the Decline.
An Enquiry concerning the Practicability of Typical Educational Aims.
The Use of Hearing Aids in Schools for the Deaf.

1938 *An approach to the study of a Foreign Country.*
The Position of Modern Language Teaching.
Tests of Hearing Aids and Lip-reading.
The Handicap of Deafness.

General Observations.—(1) The amount of research undertaken by the staff is obviously governed by the scale on which the department is staffed, and by the time available for original work to be undertaken. Lectures, the supervision of teaching practice and examinations bear more heavily on the available time at a university where staffing is not on a generous basis.

(2) It would appear that the special interests of the head of the department

naturally have some influence on the nature of the research undertaken, e.g. whether it is mainly psychological, historical, or concerned with problems arising out of the curriculum of schools.

(3) The provision in certain universities of specified lectureships or research studentships in some aspect or other of education naturally stimulates research in these cases. Thus, one university offers from time to time an advanced studentship in education of the value of £150–£200, the successful candidate to undertake research and also to enter for the degree of M.Ed. and in addition there is a sub-department in the education of the deaf (staffed by a reader and two lecturers); this department has carried out research throughout the last nine years.

(4) The research undertaken by students is carried out during the course of study for a higher degree. (This is not to say that in some cases the research may not be undertaken as an end in itself.) Without a complete list of theses in education presented for higher degrees at all universities and colleges in England and Wales it is impossible to say whether there is overlapping and whether a student may not be devoting time and energy to the study of some subject which has already been fully and satisfactorily investigated elsewhere. The great majority of theses remain unpublished, but an abstract of their content is usually available at the university, and it should again be noted that those dealing with mental abilities are recorded in the *British Journal of Educational Psychology*.

(5) The existence of a research degree in education at certain Universities served to encourage systematic inquiries at those centres.

(6) The amount and extent of university research in education appear on a summary view to be somewhat less than that carried on in other departments (e.g. the sciences, history, languages). This is no doubt largely due to the fact that education as a subject is not generally studied in undergraduate courses and that candidates for research degrees in education are required to have taken a year's post-graduate study in education and in addition, have had experience of teaching before embarking on recognised research.

(*b*) *Training Colleges.*—The questionnaire was issued to 82 colleges and replies were received from 19, of which one was a *nil* return. Of the 19, 9 favoured the proposal for a national committee, 9 expressed no opinion, and 1 was against it.

General Remarks.—The research and inquiries reported are of a minor character and are carried out by members of the staff. Lack of time and financial difficulties are mentioned as obstacles to the prosecution of research and it will be noted that in most of the colleges the students only take a two-year course for the teachers' certificate and that the academic standard falls below that which obtains in the university education departments. As the specimens quoted below will indicate, the inquiries are mainly connected with the curriculum of primary schools and are usually undertaken as much with the object of training the student in independent inquiry as with that of arriving at results that are valuable in themselves.

Among points of interest are the award at one college (domestic science) of a studentship of £75 to a student on the completion of a three-year course for the purpose of carrying out studies under the direction of the Principal. At this college work has been carried out continuously since 1935 'on the application of the principles of good posture to Housecraft.'

At another college, advantage was taken of its removal to new buildings to experiment with a new type of subject room which will be suitable to the subject taught, and flexible in adaptation for lecturing, tutorial methods or laboratory work. A special chair was finally designed for this purpose, has since been patented and is now manufactured by a firm of educational furnishers. The form of equipment adopted was worked out in collaboration with the college staff and the city architect's department. This college has also taken part in the local civic survey.

Specimen list of research carried out at a training college.

Still in progress :—

An investigation into the scientific interests of boys and girls in Senior Elementary Schools, as indicated by the questions they ask in response to direct invitation.

An investigation organised by a Standing Committee of the Geographical Association into children's understanding of contoured maps was carried out in local schools, as well as elsewhere by old students of the College at the suggestion of the lecturer in geography. The results are to be published later (based on this and other data).

(iii) Educational Associations and Teachers Organisations.

(*a*) *Educational Associations.*—The questionnaire was issued to 14 educational associations. ' Subject ' associations were excluded, though it is known that some of these have conducted research into methods of teaching individual subjects. All of the associations approached except 1, supplied information. In 7 cases they approved of the principle of a national research committee ; in 3 cases they asked for further information and in 3 they expressed no opinion.

General Observations.—As might be expected, the amount of educational research—in the widest sense of the term—conducted by educational associations is both varied and extensive. It covers such items as the survey of Education for the Blind and inquiries into the assessment of the intelligence of blind children (by the National Institute for the Blind) and the detailed syllabuses in biology and reports on the teaching of General Science (by the Science Masters' Association) as well as the inquiries into various aspects of adult education conducted by the Workers' Educational Association.

Generally speaking, the title of each association indicates the scope of such research and inquiries have been carried out under its ægis. Thus the British Film Institute is concerned with the ways in which the cinema can be used in the service of the community other than as ' entertainment.' Hence it has (*inter alia*) compiled reports on the use of the film for teaching various subjects in the curriculum, and has investigated the effect of the film on the adolescent, and it takes a special interest in the technical requirements of optical aids.

Similarly, the National Institute of Industrial Psychology has conducted inquiries of outstanding value into two aspects of education on which the Institute claims expert knowledge. These are :—

(*a*) The heating, lighting and ventilation of schools ;
(*b*) Vocational guidance for school children.

Again, the Central Association for Mental Welfare is particularly interested in the ' problem ' and ' retarded ' child, and it is noteworthy that the Association made investigations on this subject in 10 local education areas during 1936 and 1937 at the request of the L.E.A.'s concerned. (The fact that certain of these investigations do not appear to be known outside these areas may be cited as an illustration of the services that could be formed by a central committee or council for disseminating the results of educational research.)

Considerations of time and space prevent a detailed examination here of the nature and extent of the research work of these educational associations, but it is evident that quite apart from what might be called their propagandist work in education several of these associations have conducted pioneer investigations which are of definite value.

The wide range of these inquiries within the special field of the organisation is

notable in the case of the British Institute for Adult Education and the New Education Fellowship. Among the inquiries conducted by the former in recent years, are investigations of reading interests and habits, educational uses of the gramophone, 1933–36, the educational work of the unemployed clubs, the ' consumers ' (i.e. the student's view of adult education, and a survey of art galleries and loan facilities. The New Education Fellowship has recently completed two inquiries, one on examinations and another on the training of teachers and is at present investigating the relation of the independent schools to the state system. Nor should the inquiries conducted by the Central Council for School Broadcasting be overlooked : an excellent example is the report on experiments designed to illustrate the reaction of senior school pupils to broadcast lessons (Inquiry Pamphlet No. 4).

This list could be considerably amplified if one were to cite the systematic inquiries conducted under the ægis of the various educational trusts ; a good example is the Enquiry into Secondary School Libraries, which was initiated in 1936 by the Carnegie United Kingdom Trust, and covered ground that had not previously been explored.

As there are many associations connected with some aspect or other of education and their activities are widespread there is a clear need for some central body which would accumulate information about their activities, more particularly their positive achievements in research. This would in due course imply the critical selection and recognition of unquestionably valuable results of experimental work that had been undertaken in a scientific spirit, as distinct from investigations prompted more by the desire to prove a thesis than to discover truth objectively. This function of impartial analysis is one that can only be performed by a representative central body.

(*b*) *Teachers' Organisations.*—The questionnaire has been issued to all of the principal teachers' Associations (10). Full information has been received in every case. Seven, including the four Associations of Secondary Teachers, and the Head Teachers, have approved of the principle of a national research committee ; in the remaining cases no opinion has yet been expressed.

General Observations.—Teachers' organisations were founded primarily to advance the professional and educational interests of teachers, and it is true to say that the establishment of national salary scales and superannuation schemes, and the improvement of conditions of service (such as security of tenure) inevitably took precedence over other activities. These professional activities will continue to be important, particularly in times of economic stress. In recent years, however, the educational activities have developed considerably and teachers are exercising more influence on the nature of the curriculum, examinations, and teaching methods generally. This is in accordance with their ultimate wish to give the profession as large a measure of self-government as is both reasonable and practicable.

Accordingly most teachers' organisations have from time to time set up committees to explore certain problems and the results of their inquiries have been published in reports or memoranda which are often published through trade channels. Thus, for example, the National Union of Teachers have investigated in collaboration with the Association of Education Committees such questions as the Entrance Examination to Secondary Schools, the ' extra year ' (the influence of the higher school leaving age), School Buildings (in conjunction with the N.I.I.P.), and the Training of Teachers (N.U.T. alone). This side of the Union's work is rapidly expanding ; the published volumes have had a wide circulation, and it is understood that the Union has in contemplation an extended programme of educational inquiry.

Again both the Assistant Masters and the Assistant Mistresses Associations have published memoranda on the teaching of various subjects (e.g. English, History,

Modern Languages, Geography) (by the former) and Classics, French, Physical Education, Religious knowledge (by the latter)). The Assistant Masters have also produced a handbook for School Librarians, and they are now investigating the work of Careers Masters and (in collaboration with the Science Masters Association), the teaching of Science.

The National Union of Women Teachers has also produced a series of booklets on the Infants', Junior and Senior Schools, while the National Association of Schoolmasters has (*inter alia*) completed investigations on the Extra School year, Juvenile delinquency and on School Camps.

Not the least interesting and pertinent contribution, from this Committee's point of view, is that of the National Association of Head Teachers. Its first general Secretary, the late Mr. T. G. Tibbey had always advocated the need for research in education, and as a memorial to him the N.A.H.T. have endowed an annual lecture on some aspect of educational research. Three such lectures have already been given.

Periodically, supplements have been published in the N.A.H.T. Review, embodying the results of research on teaching methods conducted by an individual member or committee of members. Typical instances are ' Factors in Scholastic ability ' and ' Does the teaching of Grammar aid Composition ? ' Certain funds contributed as a memorial to Mr. Tibbey are available to assist educational research and grants are made to local associations of the N.A.H.T. that undertake definite research work (e.g. a grant of £10 has been made to the London Association which has investigated ' Variations in Test Performances among first year Senior Boys ').

The N.A.H.T. sponsored the attempt to form a research section under the ægis of the Royal Society of Teachers in 1935 ; they will most readily assist in the formation of a national research committee.

Associations that cater for a specific class of teachers naturally limit their inquiries to those problems with which they are most concerned. Thus the College of Teachers of the Blind has investigated and published (1932) *Syllabuses of Training for Technical Students in Handicrafts*, published by the Blind : they have also published *A Survey of the Education of the Blind.*

The Training College Association has recently published a memorandum on the *Training of Teachers*, compiled by the Joint Standing Committee of the T.C.A. and the Council of Principals. Its various sections publish periodically reports on methods of teaching school subjects, and accounts of experiments are reported in the T.C.A. *Bulletin* (e.g. in the issue of June 1938 appears a detailed account of an experiment with an environmental course at a Training College).

Other Agencies for Research.

The Committee feel that this survey of research carried out by the various agencies referred to above should be supplemented by reference to inquiries conducted by other organisations.

(*a*) First and foremost is the Board of Education : (*b*) mention should also be made of the Enquiry into Examinations, the International Bureau of Education and the Year Book of Education.

There are in addition individual teachers and others investigating various special problems in education, but adequate information as to their work is lacking. If the Committee have not emphasised the value of the researches by psychologists into the mental abilities of children, particularly in such matters as intelligence tests, this is only because they feel that justice has been done to the excellence of their work by such accounts as those given in the *British Journal of Educational Psychology* and the *Year Book of Education.*

(*a*) *The Board of Education.*—The Board of Education does not engage directly in educational research. The traditional English view of the functions of government departments is that under Parliament they should prescribe the broad outlines of policy and leave to local authorities, existing institutions and private enterprise as much initiative and liberty as circumstances permit. This is particularly true of our educational system, whose freedom from central control stands out in sharp contrast to the centralisation found in some other countries.

Nevertheless because the Board of Education does not exercise any responsibility for educational research, it would be wrong to assume that it is not interested in educational research or that it does not engage in educational research. The Board engages actively in educational research in so far as it is incidental to its administration, and its attitude to educational research on the part of others is in general one of friendly encouragement.

The two characteristics of research in the narrow sense of the word are the use of the inductive method and experimentation. Educational research of this kind implies a control of the field of experiment which the Board does not possess. The responsibility for conducting the schools does not rest with the Board, but with the local authorities and managing bodies, and the Board does not as a rule undertake experiments in the schools which would involve detailed control by the central authority of conditions which are normally under local control. Many kinds of research affecting schools and teaching thus naturally fall to local initiative, including that of the teachers, for instance experiments connected with methods of teaching. Occasionally also outside bodies make their own arrangement with the school authorities for securing the requisite facilities for conducting a research. When, however, in the course of administration, a problem of widespread practical importance is encountered in which schools and local authorities and the Board of Education all find themselves concerned, it is open to the Board to initiate and take joint action in conducting experimental work directed to the solution of the problem. An illustration of this is the research which the Board and certain local authorities have been together carrying on for some time into tests of capacity and attainment for the selection of children for transfer from the public elementary to the secondary school.

Research in the widest sense of the word includes investigation based on the inductive method but not involving experimentation. Educational research in this sense includes investigation in all parts of the educational field, not merely in administration and organisation, but also in the history, theory and practice of education. The Board's many activities in this connection are summarised in the following paragraphs.

The Board's Standing Committees, notably the Consultative Committee, the Adult Education Committee, and the Secondary Schools Examinations Council, have produced many well-known reports on educational problems based upon deliberations in which the sifting and review of the relevant facts has generally been an important element. The same applies to the Interdepartmental and Departmental Committees which the Board set up from time to time to investigate and advise upon particular problems. Some of the reports of the Consultative Committee are noteworthy, not merely in themselves, but also on account of the results of researches embodied in them, for instance the historical note on faculty psychology by Prof. Burt, the memorandum by Prof. Hamley on cognitive aspects of transfer of training, both printed as appendices to the Consultative Committee's recent report on Secondary Education, and the historical chapter of that report by Mr. R. F. Young, the Secretary.

The Board's Inspectorate is a highly qualified body of men and women with experience of teaching, whose daily work brings them into contact with the schools. Many investigations are conducted through them, sometimes through the Subject

Panels, and sometimes through the Inspectorate generally. The Subject Panels consist each of about 10 Inspectors who are experts in a particular subject, e.g. Science, Classics, Modern Languages, Infant Work, Domestic Subjects. An example of the results of an investigation by a Subject Panel is the Pamphlet on Optical Aids published in 1938. Examples of the results of investigations through the Inspectorate generally, leading to conclusions based on evidence drawn from the whole country, are the recent Pamphlets on Homework and on the Teaching of Backward Children. The results of the more general investigations are not always published, but are sometimes circulated through the Inspectorate and thus brought to bear on the work and practice of the schools. Typical questions which have been dealt with in this way in recent years are :

The teaching of handicraft, length of lessons.
Regional survey work as a form of practical geography and history.
Outdoor practical work in mathematics.
Science teaching, optimum size of the class.
The project method.

Above and beyond all this, the Inspectorate is continuously concerned with encouraging and noting experiments in schools. This is part of its daily work. The results are not necessarily committed to writing, but manifest themselves in the changing practice of the schools.

The Welsh Department of the Board controls a more compact and coherently organised body of inspectors, since the Principality is an administrative unit of convenient size presenting in its area, but in more manageable form, all the problems that concern their English colleagues, such as selection for post-primary education in rural and in urban areas. It appears to be the case that certain of the Welsh Local Authorities place special reliance on the guidance of the Inspectorate and this fact has enabled the Welsh Department to originate and develop experiments on two problems of particular interest to Wales with which no one else has hitherto dealt. These are the teaching of English in monoglot Welsh areas and the use of a form of Basic Welsh (in co-operation with the Orthological Institute) in bilingual areas. These experiments and the corresponding investigations are initiated and surveyed by the inspectorate.

The Board's Department of Intelligence and Public Relations conducted many investigations in the early days of its history, when it was known as the Office of Special Inquiries and Reports, and its reports not only made available for English readers a large amount of information otherwise difficult to get at, but served an even more valuable purpose in the way of suggestion and inspiration. The Department does not now itself undertake any systematic educational investigations, but amongst its many other functions it still plays an important part in initiating investigations, the Director being Chairman of the Committee which directs and co-ordinates the work of the Panels referred to in the preceding paragraph. The Department also includes the Board's Library of 80,000 volumes, which is easily the largest and most up-to-date educational library in the country, and an invaluable repository of information. The excellent facilities provided for readers are used by many research workers.

(*b*) The Committee feel that special mention should be made of the research in examinations carried out by *The International Institute Examinations Enquiry* (*England*). It was established in 1931 with the aid of grants from the Carnegie Corporation through the International Institute of Teachers College, Columbia University, New York. Parallel committees were established in five other countries and have carried on similar inquiries. Besides publishing an English Bibliography of Examinations and a conspectus of examinations, the Committee has published

An Examination of Examinations and *The Marks of Examiners*. The investigations already reported, notably those into the marking of subjects, have attracted wide attention and have incidentally served to confirm the need for the further research in examinations which is still proceeding under the ægis of this inquiry.

The International Education Bureau (Geneva) founded in 1925 has a membership open to all countries, educational institutions and other public bodies : it serves as an information bureau for all matters affecting education. The secretariat compiles documents relating to education, conducts research and institutes investigations into special questions. It holds annually a Summer Conference on Public Education at which reports are given of international inquiries and investigations conducted with the aid of specialists throughout the world. For this purpose much use is made of detailed questionnaires.

A similar organisation, though more restricted in scope, is the *International Bureau of Technical Instruction* which deals with problems affecting technical education.

The *Year Book of Education* has, since 1935, included a large number of reports on research into specific problems of education. The Institute of Education is editorially associated with the Year Book and the contributions are all by recognised authorities. In the 1939 issue abstracts of theses submitted for higher degrees in education at London University were included.

4. Possible Methods of Organising and Developing Educational Research in this Country. Examples from other Countries.

The Committee, having made the first general survey of educational research in this country, proceeded to consider suitable methods of organising and developing research.

Among possible methods of organisation and development the most fruitful appear to be :—

(i) A Central Council to direct and prosecute research.
(ii) The establishment of a Department of Educational Research either at some centrally situated university or else functioning as an autonomous unit.
(iii) A national committee to co-ordinate research and to supply information.

(1) Excellent examples of the first type are to be seen in the Councils for Educational Research for Scotland, Australia, New Zealand, South Africa and Canada. All of these except the Scottish Committee are similar in aims and constitution, with minor exceptions. The Scottish Council is a nationally appointed body enjoying support from the teachers and the Local Education Authorities and it is moreover a body directly concerned with carrying on research actively rather than stimulating or co-ordinating research. The other Councils are supported nationally but on a different basis and they are not so much concerned with prosecuting research as with encouraging and developing it. Moreover they make a special point of supplying information on educational matters and this is especially true of the South African Council with which there is associated a bureau of educational information.

At this point it will be useful to consider the constitution and functions of some of these Councils.

The Scottish Council for Research in Education.—This Council was established in 1928 as a result of the findings of a joint committee representing the Research Committee of the Educational Institute of Scotland and the Association of Directors of Education in Scotland. The E.I.S. accepted the main financial responsibility (£750 per annum) at the commencement, together with the Education Authorities (who subscribed £512 last year).

The Council is composed of thirty-two members nominated by the Association of Education Authorities (5), the E.I.S. (8), the Association of Directors of Education (5), the National Committee for the Training of Teachers (2), Training Centres and Colleges (4), The Scottish Universities (4), The Scottish Branch of the Psychological Society (2), The Association of School Medical Officers (2).

The Council, which was incorporated in 1932, has the following aims :—

(i) To initiate and control special investigations, making the necessary arrangements with the relative Education Authority.
(ii) To receive suggestions for research.
(iii) To allocate problems to suitable investigators.
(iv) Wholly or partly to finance approved investigations.
(v) To authorise the publication of results and recommendations, and to bear the cost (wholly) or partly of such publication.

It is governed by an Executive Committee of thirteen members ; there is a Finance Committee of five. The funds are derived from grants by the bodies represented on the Council and by contributions from individuals or organisations.

Since its inception the Council has undertaken a good deal of original research and has collaborated with other organisations for that purpose.

The research undertaken since 1930 includes research on standard tests for the Qualifying Examinations in Scotland, the curriculum in primary schools and for pupils of ages 12 to 15, secondary school pupils' attainments, environmental influence on mentality, mental surveys of rural and urban areas, visual aids, effectiveness of university entrance examinations. Two of its publications which have attracted widespread notice are *The Intelligence of Scottish Children* (1933) and *Achievement Tests in the Primary School* (1935).

The Australian Council for Educational Research.—This Council owes its inception to the Carnegie Corporation, for it was formed as the result of discussions initiated by an American professor visiting Australia in 1928 with a Carnegie visiting grant. Following those discussions a representative conference was called in 1929 which recommended the formation of a Council. The Carnegie Corporation voted for this purpose £5,000 annually for ten years with a further £2,500 annually for the first five years. The Council was established in February 1930 and the Executive Officer assumed duty in April.

The Council by the terms of its grants from the Carnegie Corporation must be ' independent of control by any university, state system of education or political party.' There are nine members, six of whom represent each of the State Institutes of educational research and three are co-opted.

The Council initiates research, supports investigations by approved students, teachers or administrators, advises investigators, supplies information and awards grants for observers to travel to the U.S.A. and to Europe. It sponsored the New Education Fellowship Conference in Australia in 1937. The Council has published fifty-one reports describing the results of various inquiries and researches, and retains a large number of unpublished reports.

The New Zealand Council for Educational Research.—This Council began operations in 1934 with a grant of £3,500 a year from the Carnegie Corporation. The Corporation suggested that the Council should avoid ' over-emphasis on research of a sterile sort. The Council should always feel free to give New Zealand a kind of service which is not ordinarily rated as research, a service which is capable of application in the professional field.'

A Council of seven was established (by the Corporation in the first instance) and has since been continued in office on the basis of one representative from the four local branches and three co-opted members. Its functions are similar to those of the Australian Council. To date it has published ten Research Reports and four

studies of New Zealand education. It also sponsored the New Education Fellowship Conference in New Zealand in 1937.

The South African Council for Educational and Social Research.—This was instituted in 1934 to administer a grant of £12,500 (payable over five years) from the Carnegie Corporation. It is associated with the parent body the *National Bureau of Educational Research* established in 1929 whose functions were (1) to act as a clearing house for educational statistics and ideas overseas as well as in South Africa; (2) to act as a liaison office between the various education departments in South Africa; and (3) to conduct research on educational problems and to co-ordinate such research done by universities and other agencies.

The Bureau is controlled and financed (£6,000 per annum) by the South African Government and acts as the executive office of the research council. Thus the Government and the Carnegie Corporation co-operate in educational research. This co-operation was initiated when the Bureau in 1929 at the request of the Carnegie Corporation undertook research on the subject of 'Education and the Poor White.' The position may be summarised by saying that the State maintains the National Bureau of Social and Educational Research while the Council supports research on special subjects for which the Carnegie grant is given exclusively.

The Bureau now operates five divisions :—

(*a*) Educational Research ;
(*b*) Social Research ;
(*c*) Psychological Research and Social Service ;
(*d*) National Library on Educational and Social Research
(*e*) Films.

Two conferences were organised by the Bureau—

(i) International Conference on Education under the auspices of the New Education Fellowship (1934), and
(ii) a National Conference on Social Work (1936).

The Bureau issues an annual Statistical Bulletin. The Council allocates grants for research under the five divisions noted above and is helped in this connection by an Advisory Board which meets annually. The Council has issued ten publications since 1936, embodying the results of completed research on such subjects as scholastic tests and native education.

The *Canadian Council* is in process of formation.

(2) The second type of organisation is the *ad hoc* institution or college of research of university standing which is exemplified by the *International Institute of Teachers College*, Columbia University, New York.

The Institute was established in 1923 to carry out the following objects :—

(*a*) to give special assistance and guidance to the increasing body of foreign students in Teachers College ;
(*b*) to conduct investigations as to educational conditions, movements and tendencies in foreign countries.
(*c*) to make the results of such investigations available to students in the U.S. and elsewhere in the hope that the pooling of such information will help to promote and advance the cause of education.

It publishes annually an *Education Year Book* which includes studies of education in various countries written around some special topic (e.g. for 1938 the theme was 'Rural education and rural society').

With the aid of the Carnegie Foundation for the Advancement of Teaching, the

Institute has sponsored various projects in Europe such as the inquiry into examinations (England, Norway, Finland and France) and an intelligence survey of children (Scotland).

It may be noted in passing that the Carnegie Foundation for the Advancement of Teaching has disbursed between 1924 and 1938 137 grants, totalling £250,000 for 82 projects in the field of higher education. Fourteen of these have been carried out in the offices of the Foundation, 68 under the auspices of other institutions.

The Institute is associated with Teachers College, which is a homogeneous unit of Columbia University in the same way as, e.g., the Imperial College of Science is a constituent college of London University.

(3) There is lastly the type of organisation which takes the form of a national co-ordinating Committee. This has been previously mooted in this country as mentioned on pp. 534 and 535, but the difficulties of establishing such an organisation have proved to be considerable.

Nevertheless there is an impressive body of opinion cited previously in favour of the establishment of such an organisation.

5. Recommendations and Conclusions.

This Committee has had to consider which of these three types of organisation would be suitable for England and Wales. They are of the opinion that the first type—a national council for the prosecution of research is not the most suitable type to establish for England and Wales. Realising the valuable work that has already been accomplished by the Scottish Council, and by similar councils in the Dominions, they feel nevertheless that as research in the widest sense of the term is already being carried on by so many agencies in this country it would be unnecessary to establish a directing council which would itself initiate and carry on research.

Many of the replies received in support of a national research organisation are in favour of co-ordinating research instead of the active prosecution of research. Several correspondents express the fear that the effect of the establishment of an *ad hoc* Research Council would be to diminish the spontaneous activity of Local Education Authorities and teachers in carrying out their own inquiries and researches. Those who are most active in research invariably support the principle of a co-ordinating committee in preference to an executive research organisation.

Similarly, the Committee do not think that a college or an institution for research affiliated to a university can be recommended as suitable. Any Council or committee or institution connected with educational research must, they feel, be linked up with the universities generally, and also with the local education authorities, the teachers' organisations and the educational associations.

It cannot effectively function as a unit devoted to a specific purpose. The tradition of English education is against central control or monopolistic activity. Greater benefit would be achieved if a central committee were to stimulate research and supply relevant information to all interested.

They feel therefore that what is wanted is an organisation that will co-ordinate research rather than undertake it, will register and record it, will prevent overlapping and guide individual workers or teams of workers to those fields of study wherein their inquiries can be most profitably conducted for the benefit of all sections of our educational system.

Accordingly they propose that a national committee should be established having those functions and in addition acting as a central bureau for information.

The functions of such a national committee would in fact be administrative rather than executive. Its control should be vested in just proportions among the supporting

bodies which include the universities, L.E.A.'s, teachers' associations and educational bodies. It should work in full co-operation with all of these ; it should maintain close co-operation with the Board of Education and keep in touch with Research Councils in the Dominions, the U.S.A. and Europe.

The establishment of such a national committee would, they are convinced, bring immense benefits. They do not underestimate the difficulties, chiefly financial, but they are impressed by the cordial goodwill with which the suggestion of such a committee has been received.

Proposals for Establishing a National Research Committee.

They realise that to bring such a committee into being involves the adoption of one of several methods :—

(*a*) The Committee or Council might be established forthwith on as widely representative a basis as possible. This course would necessitate comprehensive guarantees of financial support, as well as a precise definition of the council's functions. If an annual income of from £2,500 upwards were guaranteed, the Committee could commence operations with a reasonable certainty of ultimate success. It could not only record and register research, but assist research into urgent problems by allocating grants to experienced investigators. Its financial basis would have to be assured however. If it had no financial resources the Council would have to prove its effectiveness before it could expect financial support from other quarters such as Trusts and Endowments for educational purposes. But it could scarcely expect to establish its position and prove its effectiveness unless it had sufficient resources to guarantee a successful start. It is on this question of finance as much as on the practical difficulties of organisation that all previous attempts to develop educational research in this country have failed.

(*b*) Should the action contemplated in (*a*) above prove to be not immediately practicable owing to lack of funds, an alternative might nevertheless be available in the form of joint action between the representative Committee or Council referred to and some suitably placed university centre. The hope that some such way of proceeding might prove possible is strengthened by information brought to the Committee's notice of a project to establish a bureau of inquiry and research at the University of London Institute of Education. It is understood that the English Committee of the International Institute Examinations Enquiry—an undertaking which has continued since 1932 with the financial support of The Carnegie Corporation of New York, is about to terminate its activities. It is anxious, however, that the work of inquiry and research should continue, not only into questions concerning examinations but into other educational problems also. The Carnegie Corporation shares this desire and is accordingly prepared to make available a sum up to $10,000, provided that this sum is met by equal contributions from other sources.

The Examinations Enquiry Committee (under the Chairmanship of Sir Michael Sadler) is now engaged in an effort to raise at least £4,000 in addition to the grant from the Carnegie Corporation. Such a total sum, rather more than £6,000 at the least, might, it is felt, be sufficient to justify a three-year experiment.

Sir Michael Sadler's Committee proposes that the sum thus raised would be at the disposal of The Institute of Education for the purpose of establishing a bureau of inquiry and research. The Institute, it is understood, is prepared to receive and administer the money for a three years' period on this condition.

It is further proposed that to advise on policy an Advisory Committee should be appointed, representative of The Universities, L.E.A.'s, Teachers' Associations, and other organisations directly interested in educational research.

The administrative organisation at the Institute itself would be kept as small as

conditions permit in order that the bulk of the money might be available for the financing of research projects. Some would be expended on projects initiated and carried out by the bureau itself; the rest would be used to make grants to workers of proved capacity carrying out investigations approved by the Advisory Committee.

There is much to be said in English conditions for a limited experimental project on these lines carried out over a tried period before finally establishing a permanent organisation of full national scope. *Moreover, it is understood that if the experiment proves successful the Institute would be prepared to merge its interests in a permanent national organisation and would, indeed, conduct the bureau from the first with that object in view.*

Further, it would accept as its own Advisory Committee a representative body such as is proposed in (*a*) above. In this way there would be provided from the outset a link between the activities of the Institute's Bureau and the wider national interest.

(*c*) The scope of the above plan does not include provision for the *bureau of information* which is everywhere felt to be urgently needed. The exclusion of such provision for the present scheme springs not from any underestimate of its importance but rather from a sense of the magnitude of the effort involved. The funds likely to be available for the Institute would do no more than cover the costs of a central office and of a limited number of inquiries into questions of urgent practical importance.

The financing of an information bureau must thus be regarded under present conditions as a separate question, and one to which the British Association might well devote some thought and effort. Should such a bureau be established the two ventures could work in the closest co-operation under the guidance of the same representative committee and when the time arrives could be merged into one central office of information and research.

The Committee having considered these possibilities are of opinion that it is desirable to ascertain whether there is any general support in favour of one of these alternatives.

RECOMMENDATION.

They therefore *recommend* that as a first step the British Association should take the initiative in convening a representative conference to discuss ways and means of establishing a central committee for educational research and that this conference be held not later than December 31, 1939.

APPENDIX.

Copy of Questionnaire circulated to Local Education Authorities.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

COMMITTEE OF INQUIRY INTO EDUCATIONAL RESEARCH.

Chairman:
Prof. F. CLARKE, M.A.
Institute of Education,
University of London, W.C. 1.

Secretary:
A. GRAY JONES, M.A., B.LITT.
29 Gordon Square,
W.C. 1.

.....April, 1939.

To.....

DEAR SIR,

The above-mentioned Committee has been set up by the Council of the British Association in order to investigate the possibilities of organising and developing research in education.

What is meant by 'Educational Research.'

The term 'research' is used in its widest sense, and includes in this connection not only formal investigations such as inquiries into examinations, intelligence tests, etc., but also experiments and inquiries about such matters as the curriculum and organisation of schools (including special schools), equipment, heating, lighting and ventilation, the relationship between physical training, nutrition and educational fitness.

Methods of Organising Research.

While the Committee have not come to any conclusion as to ways and means of organising educational research, they are generally in agreement that a suitable form of organisation would be that of a central council which would co-ordinate the activities of many autonomous bodies and should be in close touch with similar bodies in the Empire and in other countries.

Information Required.

The Committee as a first step are compiling information on the amount of educational research now being carried on under the auspices of your authority.

I should therefore be greatly obliged if you would kindly complete and return to me the enclosed questionnaire not later than May 20.

My Committee will gratefully acknowledge any help given by you in this matter.

I am,

Yours faithfully,

Secretary.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Committee of Inquiry into Educational Research.

1. Name of Local Education Authority.

2. Title and brief description of investigations, surveys or special inquiries carried out under the auspices of your Authority in recent years (say since 1929), the results of which might have a wider rather than local interest.

3. By what agency was the investigation, survey or inquiry carried out?

   (*a*) By the L.E.A.
   (*b*) By some other agency—

      (i) with financial support from the L.E.A.,
   or (ii) without financial support.

4. Would you favour the creation of an organisation, national in its scope, for the more systematic pursuit of such inquiries as for example are defined in the covering letter.[5]

5. Any other remarks.

Any printed or stencilled copies of reports on 2, 3 and 4 above would be greatly appreciated.

[5] The British Association is devoting attention to the form that such an organisation should take and will be glad to communicate later with you on this point.

SCIENCE AND SOCIAL PIONEERING

THE FIRST BRITISH AND AMERICAN ASSOCIATION LECTURE *

By Dr. ISAIAH BOWMAN

PRESIDENT, THE JOHNS HOPKINS UNIVERSITY.

The classic tale has man witless until he receives the Promethean gift of fire. Light and fire are the age-old symbols of the mystery of the creative force in man, or of what some would call the divine beginnings of man's discovery of a forward way. We talk less of mystery to-day for, if the source of the light of understanding is still unknown, man himself has successfully trimmed the wick. Reflected, dispersed, and recombined from thousands of mental and spiritual facets, the light reveals ever-new possibilities of adventure, experiment, and stimulating insight for the self-conscious creature, half angel, half brute, who talks endlessly about his elusive dest ny. Whatever their own genius may be, all thoughtful persons borrow or reflect enlightening fact wherever they find it, and observe with alternating hope and anxiety the endless search by other men for that object of faith and labour called progress.

Reflecting in this fashion, it seemed to me presumptuous to express only my limited individual opinion in this opening address in an annual exchange between the British and the American Associations for the Advancement of Science. It seemed better to inquire of others what they would choose to say. Because scientists are apt to praise the children of their brains, the views of non-scientists were sought on the contribution of science to social welfare and to that uniquely human process of consciously planned advance across the threshold of experience which we may call social pioneering.

To that end I invited one hundred men who are not engaged in either physical or biological research or teaching to express their opinions. For special reasons two exceptions were made. The opinions are almost wholly American ; I have included those of but a few English and French friends. The list includes lawyers, teachers, artists, poets, government officials, historians, economists, preachers, industrialists, left-wing and right-wing publicists, military men, bankers, and railway executives, as well as a member of the United States Supreme Court, a member of the President's Cabinet, public institutions of many kinds, men with power of command over others, and men who exercise power only through ideas. With few exceptions they are men whose names are well known on both sides of the Atlantic.

Each person was asked to set down not his studied or rationalised opinion

* *Owing to the premature termination of the Dundee Meeting, this lecture was not delivered.*

but rather his quick and customary response to the idea that science has or has not added to man's cultural possibilities, given him a better way of thinking through his difficulties, raised his hopes for a more ethical civilisation. Was his *habitual mode of thought* with respect to these propositions positive or negative?

To keep my promise to contributors the following twenty numbered statements, which combine the one hundred opinions, are given without references to sources. They are arranged in three groups—those which emphasise the gains (12), those which express qualified approval (5), and those which point to losses (3). No attempt has been made to give them consistency (compare, for example, items 10 and 5).

Emphasising the Gains.

(1) Science is to-day the most excited front of human enterprise, and such excitement is a good in itself. The fact that tens of millions of people are interested in scientific discovery and theory is one of the hopeful things in this Pandora's box of a time. Conceivably these tens of millions are or might become interested in a wider view of human affairs.

(2) The light that science has thrown on religion has made the difference between fearing God and believing in God, for it brings God within the sphere of personal experience. It has done this mainly through the removal of the fear of the supernatural. It has not lessened the force of religion by weakening the force of orthodox religion. There is neither an Acheron nor a seat of torture of souls: the shades are peaceful abodes. There is a proven moral law—that is good which experience has shown to be good.

(3) Science has enabled us to understand many catastrophic forces though we control or combat, with limited success, but a few. Thereby it has reduced the areas and much of the strain of ignorance, superstition, and myth. Forecast in several fields has entered so effectively into civilised man's thinking that it tends to stabilise both mind and act to a remarkable degree, giving a sense of permanence or at least assurance in the midst of obvious change. We no longer cower before 'the forces of nature,' at least intellectually.

(4) Science has encouraged specialisation, and specialised knowledge is the mother of invention. Both have greatly complicated life by making us all increasingly interdependent. In the past half century a multitude of new occupations has grown up employing millions whose livelihood is dependent upon multiplied wants and the complexities of specialisation and interchange that feed them. Science and invention, and commerce between the less civilised and the more civilised peoples, have encouraged a phenomenal increase in world population. 'Back to the simple life' would mean starvation for many of these millions: it would also mean additional manual toil for almost all of us as well as diminished comfort and security. There can be no *Erewhon*.

(5) Science serves an expanding civilisation but we do not know anything at all about our ultimate fate: the future is beyond conjecture: 'the end is forbidden.' If science has introduced dangers it has also made a net addition to human welfare by greatly expanding man's identification and use of natural resources. Humboldt's dream of 'enlarging the outlook of mankind' through

geographical study has been realised : the diversities of the earth have enriched life immeasurably. Synthetic chemistry has supplied a host of new products and opened gateways to still wider conquests afield. Like animal and plant breeding, it has changed the human potentiality in, and therefore the significance of, large parts of the natural environment. It has not destroyed geographical diversity, but it has become a factor in the rearrangement and revaluation of diversified resources.

(6) Science insists that *facts* are indispensable in the ordering of social change or reform. Though we proceed by trial and error to a large extent, it is science, especially the analytical use of statistics in the social field, that ruthlessly exposes error and helps to restrict the areas of prejudice and uninformed preconception. Sentiment and emotion have their place in the evolution of society from lower to higher but in themselves they are fallacious guides. Social programmes are put forward as tentatives or hypotheses if the scientific method is followed. In earlier times one could give categorical answers to all questions of objective and meaning. Science has eliminated much of the categorical.

(7) The effect of the doctrine of evolution upon modern thought in many fields has come to be incalculably great. It has revealed a far more complex universe than had been conceived under the assumptions of fixed numbers and kinds of species that in turn accorded with the simplicities of the geometry and the idealised astronomy of the Greek climax. It destroyed in time the over-generalised doctrine of universals in nature. It weakened the hold of metaphysics upon observational significances. It showed up the limitations of abstract logic in discovering or assimilating truth that is either essentially irrational or subject to change as new facts emerge and men are driven to make ' a fresh examination of particulars,' as Francis Bacon phrased it. It gave new meanings to both science and society by its revelation of a body of knowledge that drew its ordering from the historical record of the origins and evolutions of types correlated with the geological time-scale on the one hand and with experimental results on the other.

(8) Many of our social problems are ethical and in this respect the common man is perhaps the equal of the intellectual in balance, temperament, and insight, or even surpasses the insulated and stylised man who has the protective walls of an institution around him or the assurances of recognised social position or wealth. In these days of exaggeration, when mere political mechanisms tend to be worshipped as golden calves, the scientist at least knows that there is no collective salvation of souls and no final order. It is the business of science to discover truth, not salvation. In many instances salvation comes through the emotions and they are generally inaccessible to reason : it is also in large part an inner process, as Mazzini observed : ' You will not have things better until you are better yourselves.'

(9) Historically, the indebtedness of economic study to natural science is two-fold : replacement of the naïve premises of classical deduction by positive data, and the use of such data in facilitating the much-neglected but indispensable step in economic deduction, namely verification. The methods and objectives of political science have been re-examined under the inspiration of scientific influence. A healthy iconoclasm has ensued and the positive approach has become dominant. Historical writing has come to

have greater accuracy and objectivity, less emotion, prejudice and prepossession, and more convincing conclusions, but might not these qualities have been gained without the example of science ?

(10) Public health has been promoted by progress in biology and biochemistry and by public acceptance of or demand for appropriate administrative measures. Out of the disaster of the Asiatic Cholera in the thirties of the last century arose the office of Registrar-General in England over which William Farr presided for a time. Concerning that event Dr. Parkes, an English hygienist, wrote : ' It is impossible for any nation, or for any government, to remain indifferent when in figures which admit of no denial, the *national amount of health and happiness, or disease and suffering, is determined* [our italics]. The establishment of the Registrar-General's office in 1838, and the commencement of the system of accurately recording births and deaths, will hereafter be found to be, as far as the happiness of the people is concerned, one of the most important events of our time.' During a discussion in Parliament in 1875 on the Public Health Act, described as the most complete code of sanitary law in existence, Disraeli said : ' The public health is the foundation on which repose the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman.'

(11) The scientific attitude of mind is indispensable to further social progress but scientists should be more modest in their claims. However closely one investigates and measures there is always a gap at the end to be jumped by the imagination. The gap can be narrowed considerably by careful thought but after that one wants just knack or nose. Truth is deep down, said Democritus. In social applications of science one should be mindful of the precipitate of human experience which tradition represents as well as of the conflicting solutions and assumptions which we have inherited. Science itself does not supply adequate motivation for dedicated and unselfish living, living on a high level. If a scientist has these qualities it is because he is something more than just a scientist. Science has given a vast number of material satisfactions, but where has it left public thinking with respect to the heroic struggle without which a people has no fibre, no victory ?

(12) Humanitarianism and democracy stand in the way of wider applications of science to social problems : they have permitted an enormous increase of population, with a rising proportion of biologically unfit and a rising standard of care for the unfit. Civilisation may be too much for *Homo sapiens*, but at least we keep on trying, and science is one of the ways of trying. At times the growth of large corporations has also stood in the way of wholesome social change. In the absence of any clear philosophy of control by society they grow past the bounds of public knowledge. While they have had well-know beneficial effects they also permit a modern form of ruthless raiding. A democracy is required that not only gives economic and political opportunity but also treats men as ethical and spiritual beings.

Qualified Approval.

(13) Science, largely by its emphasis upon the freest and widest inquiry, has aided in the diffusion and acceptance of the principle of religious and racial

toleration, but there is grave doubt of the strength and permanence of this gain.

(14) Lord Kelvin's remark that ' you do not know much about a subject until you have tried to measure it ' is clearly applicable only to that which can be measured. Science deals quantitatively with measurable things and less with *quality* which supplies the essence of culture. With its emphasis upon a mechanistic theory of inevitable law, science has acquired a prestige that can be a real danger. The crucial question is, what has science done to enable the individual to *see* the pattern of his ideal more clearly and to *fulfil* his new vision ? Measurement and accuracy do not touch even the fringe of social questions. The totality of human affairs (ideas, beliefs, conduct, habits, institutions, etc.) cannot be reduced to deterministic sequences. Knowledge of facts does not tell us what to do about them. *Social action is based upon assumptions, expressed or implied, respecting human values.* Science helps indispensably, however, in its zest for truth, for careful observation, for an even-tempered attitude.

(15) Science has shrunk the planet, close-knitted civilisation, and practically revolutionised life. Once we thought it remarkable that *news* from all over the world got to us each morning ; now the distant trouble itself is at our door. While our curiosity has been widened, will anyone claim that our sense of responsibility has been enlarged ? Are we usefully informed or only distracted ? A high degree of accuracy has been attained by news services if methods and time limitations are taken into account, with the result that ' public opinion ' has gained a status not unlike that of a world conscience. The dictators always lay hands first upon radio, cable, and newspaper. They wish the rest of the world as well as their own people to be unaware ! Two chief difficulties delay the realisation of a better international order : (1) the increasing dependence of individual welfare upon a limitlessly expanding number of other individuals unknown to him as persons ; and (2) the creation of an unbelievably complex web of human ordering beyond our present means of guidance.

(16) Very few people know anything about or care about science in a fundamental sense. The better a product becomes and the more widely it is used the less public interest is shown in its origins and mechanism. It is the æsthetic factor that now counts most in a motor-car : all cars run well. The public will continue to accept the findings of science but, if pushed too fast in the direction of new social schemes called ' scientific,' they will become frightened. Our time span for social change is now much shorter than formerly. In an earlier day more time was given to absorb change without conscious direction. Hair-trigger thinking is now fashionable in the social field, with action but an instant behind, and the revisionary habit of science applied to such thinking would have a desirable sobering effect. At present, applications are left to mediocre minds. Shamefully little progress is made towards the solution of basic social problems such as housing, access to medical care, stabilisation of employment.

(17) Universal education offers the only hope of establishing in the minds of the people the minimum conclusions of science that bear on social welfare most directly, or appear to do so. These minimum conclusions can become the blueprint of social engineering only if they are kept within the range of

mass thinking. That range, in turn, is limited because human desires are dynamic and simple, while human intellect is telic and complex. Desires propel, intellect can only feebly guide. ' People ' see the *things* of science and forget the *discipline*. Their minds are littered by ideological concepts and dogmas, incapable of verification, that stand in the way of acceptance of a scientific approach to social problems.

Losses.

(18) We live in ' the dark hour of a gifted age.' Science has made war more terrible ; it has debased mankind by its growing disregard for helpless and innocent non-combatants ; it has forced the whole of civilisation to adopt the most horrible methods of destruction. Men have tried to agree not to use the worst instruments of warfare, as the Church once tried (1139) to anathematise the use of ' the deadly and hateful art of crossbowmen and archers in wars against Christians and catholics ' ; but in the end each new frightfulness triumphed.

(19) It is a clever, cynical, and hard-bitten world that science is making, one in which the idealistic and the spiritual are bound to have a diminishing place. Viewed against a background of classical education science has been a disadvantage to our society. If the most important questions of mankind are those concerning spiritual relations with one another and with God, then science is not to be taken seriously. Through dazzling discovery and successful practical application science gives a sense of power that is both demoralising and dangerous. We are given an enormous driving force that makes it more dangerous for us to be as bad or as foolish as we could be with impunity down to the middle of the eighteenth century. The impact of science on our morality, individual and national, is evil unless we rise successfully to the test of our character and moral traditions. Science has taught us analysis but we have had as yet no large-scale and equally successful synthetic constructions that bear on human conduct. The mass mind seizes and acts upon perverted ideas of scientific generalisation. Darwin's ' survival of the fittest ' encourages men to be brutal ; Freud's ' don't repress,' to indulge their passions ; Einstein's ' relativity,' to think that truth doesn't exist and doesn't matter.

(20) The fickle wishes and caprices of men, in economics and government particularly, have been given weight and apparent rationality by the adoption of unsuitable methods devised by technocrats accustomed to weighing material objects. To limit oneself to ' data ' in social studies is to parody society. Human science must think of life as a whole. The riddle of life is not in objects or discoveries without, but in conscience and mind within. A man's ' destiny ' is what he can make out of his own character.

' Science ' is not a Universal.

In weighing these responsive observations one does well to keep in mind that what we call ' science ' is largely though by no means wholly a conscious intensification of methods and results that had exceedingly remote origins. Science is a part of human life, not something separate and distinct.

Farmers of all centuries, fishermen, and especially sailing folk—all have developed science of a sort : empirical observation, limited analysis and generalisation, confrontation of theory (idea) with fact, as well as revision or modification (with much myth and nonsense built in too). The methods were not labelled or systematised, cause and effect were often wrongly ascribed, but the result was progress by taking thought.

It does no good to vaunt science as if it were something that stood above the rest of knowledge—independent, self-sufficient, worshipful. As human experience, science is not a universal, a summation of knowledge applicable and useful to the whole of life ; it is rather a thing of limited categories. Science gains nothing by the decline of humanism : it is itself a special form of humanism. One asks, what is its net worth in the sum of human interests? What does it add to education, to outlook, to citizenship ? And especially what does it add to human possibilities, to spiritual incandescence ?

No claim for science may be set up without pointing to the limitations of scientists as individuals in responding to prejudice, group opinion, and the like. To most scientists, science is only a specialised form of experience. When a scientific man turns to the social framework which contains his science, conditions it, encourages or discourages it, he is bound to take account of other elements of society than his own, other tastes, other judgments of value in life. Individual scientists are often affected by the source of their support. They will tend to approve the policies of the companies that supply them with a living. They will measure a social programme by the yardstick of company prosperity. The company may be a profit-making concern or a university.

A scientific career, so-called, does not necessarily make its devotees broad-minded, cautious of the word, modest in spirit. It takes more than science to widen a narrow man's sympathies ! Science does not in itself ' turn the common thoughts of life into gold.' Few scientists have the power of persuasive exposition ; many have ' the gift of infrigidation.' Scientists have no monopoly of the power to discard dogma, the courage and intelligence to win territory from superstition. Do they call attention to the merits of scientific method ' to protect their banners and slogans ' or to improve society ?

The Concept of Change.

In so far as the methods of the physical and natural sciences teach patience, establish the value of both imagination and doubt, enhance analytical power, and provide training in observation, they are of value in any study—crime detection, historical inquiry, or the rise of contemporary social movements. But these are not powers newly acquired by scholars in our scientific age. They have always marked all research and insight, in antiquity as in recent times. The poet shares them with the scientist. What biology and geology have done is far more distinctive and new in thought than these qualities denote. They have made the Greek ' all flows ' not only a matter of time, but also a matter of form and function—change as *the mode of the universe.* How and why things change is at the core of scientific inquiry, not alone how things are.

One of the greatest achievements of science is its emphasis upon free inquiry—the mind itself in command, driven by curiosity and the sense of

intellectual adventure. The motive force in an earlier day was faith which removed ' not mountains only but the whole material environment.' Facts and events were removed from the realm of human action to that of divine grace. Theology and philosophy have since been modified, largely by the light of modern science. Evolution has required every intelligent religion to reshape its view of man. Recent pragmatic philosophy would have little substance if the evolutionary concept were subtracted. After 1860 historical writing clearly showed the effect of the evolutionary approach ; and economic theory dealt increasingly with the problems of a dynamic society. The doctrine of evolution involved the minds of men in what can be conservatively described as an overwhelming revolution. In the eighty years since the *Origin of Species* was published no thinking man has escaped its influence.

The concept of evolution influenced some areas of thought long before the modern doctrine of biological evolution was formulated. It was a maxim of Roman law that the limit of the law is its greatest injustice. To codify the law and put it into ' tables ' represented progress ; but it was greater progress to take it out of the tables again, so to speak. Precedents had been proven to be not enough ; ethics and public utility were asked to determine forms, and ethics and public utility change with time and circumstance. The whole body of Roman Law reflects an effort to apply reason and fairness to a changing society to be accommodated by an elastic set of rules in which the danger of definitions was pointed out. Principles were made to rest on experience ; they were ' rooted in a philosophic consideration of human life.'

In the natural world no such progress was made in Roman times and indeed we do not see how it was then possible. Lucretius showed what science (as he understood it) could do but he was unable to make practical proposals for social applications. An understanding of nature would drive fear out of the world, said he, and a better knowledge of both nature and the gods would help bring peace and honour to men. Only as late as our time could the principle of evolution be so variously documented that the idea became accessible and interesting to all men, not the vision of a few. Each specialist came to see fruitful applications in his own field. Dynamic change displaced ideal pattern, fixity, and immutability. Lawyer, economist, historian, geographer, priest, chemist, and statesman could speak a common language of movement, of continuing adaptation, through nature and through interactive society.

Diversities and Contradictions.

Civilisation may be usefully considered as an adventure in change. New forces are generated through the evolution of tools, the domestication and subsequent breeding for quality of animals and plants, through age-long folk experiment, and through the occupation of new lands with their diversifying possibilities. Each people carries on the adventure in a different way because of its distinctive regional environment, its unique aptitudes, and its variant objectives and philosophies.

The diversities of time, place, and race may also raise barriers to understanding. Confluent in trade and travel we are nationally divergent and often discordant with respect to philosophies and ethics. Our rules are not the

same, in Asia and America. Our languages are no more unlike than our systems of logic, or our definitions. Our ethics and our judgments also change in time. It is sometimes said that ethics and manners are matters of geography. In this fluctuant world the geography changes rapidly also, because as man changes his techniques, his tastes and his systems, so also does he change the *significance* of much of his environment.

The main job of some schools of agriculture is to raise food-production per acre. This is condemned by those who say that we grow too much food already. It is praised by those who, as in over-populated Puerto Rico, are trying to get the value of food crops per acre raised to the level of the sugar crop, now 800 per cent. above food crops in value ! The Netherlands East Indies tries to meet the reduced demand of world markets for her staple crops (rubber, sugar, coffee) by new crops—tung oil from plants imported from China, tanning material from an Acacia imported from South Africa, wood-pulp from imported pine trees. The ultimate values and distributions of men and resources are unknown to us : we suspect there are no ultimates. We keep learning in the hope of achieving net improvement for the time being. We have also learned that to learn is generally to change.

Most public discussion is babble about agriculture, industry, health, education, security, employment, taxes, war. The voter is asked to express opinions on a jumble of political and social programmes by casting *one* ballot. One item in the bundle may be desirable, another highly undesirable. What effect will an act in one field have upon desired ends in another field ? The whole must be dealt with and the individual knows only a small part.

Specialisation increases Satisfaction.

Science and much dependent invention has added to our material equipment to so great a degree that it has given ' standard of living ' the magnitude of a major social force. The individual desires to possess maximum satisfaction, and nature is explored, invention hastened, productive techniques refined to that end. Public health is improved and education made general, in order that life may be more *satisfying*. Fabrics of high utility and pleasing colour and design are now available at more generally attainable prices than formerly. The illustrative arts have opened new worlds of enjoyment to millions. Photography alone has vastly increased the satisfactions of mankind. The gains in food production are revolutionary. Quick-ripening wheat and rust-resistant wheat represent two epic breeding struggles with billions of dollars worth of human welfare at stake in the empire of the Canadian North-West alone.

Let no one dismiss the gains of science lightly with the word ' material,' as if that didn't matter ! We cannot overlook the unrelenting fact that all but a few of the people in the world *must* think about food and clothing and power, muscular and otherwise, in order first of all to live. Only a protected life provides the time and strength for continuous thought about meanings, discovery, philosophy, æsthetics. The genius alone may be an exception—the miller's son who became Rembrandt, the ploughman Burns.

The scientist no less than the humanist sees the smallness of the spiritual gains in deplorable contrast to the material benefits. What we are trying to

do, said one who helped develop Crater Lake National Park, about the forested rim of a high circular bowl in which lies one of the loveliest of the blue waters of the world, is to offset speed. When it took a day to reach the place, people enjoyed it, after earning their enjoyment. Now they rush up to the top in an hour in swift motor-cars, dash to the rim, gasp 'My God, how blue it is!' and rush right down again!

The Edge of the Possibilities.

Science has become one of the greatest of the adventures of our time partly because it deals with the edge of the possibilities. Man was always working to push past limits, but much new knowledge, and vast organisations in our day, have speeded up the process. Man has also discovered that he is changing his own possibilities as well as those of his world as he goes along. He is at the centre of his own creative experiment. He has found that what science supplies is not at all an addition, positive and beneficial, until men have proved it so. The whole of that proof is in man himself and not in admiring regard for new facts and inventions. Things and forces, social and natural, good and bad, are added to himself, with the result that ever new possibilities are emerging.

Land pioneering to-day illustrates two such interacting forces—the edge of the possibilities (marginal land) and the desire for an acceptable standard of living. The limits of land cultivation are being traced farther and farther afield. But what is left of pioneer land in the twentieth century is marginal land whose conquest requires both knowledge and better material equipment. The pioneer, seeing himself as part of a wider community, asks for a share in the total benefits. If he is to be empire builder he wants his reward here and now. So, let government do it. Roads, schools, telegraph lines, favourable freight rates, market facilities, low taxes, and security from undue risks to health on the frontier are demanded! The protection of children brings restrictions, limitations, conservatism. Things must get better in time or too many families will become habited to the backward look to optimal regions.

Science here serves as a supplement to marginal nature—what crops are adapted to uncertain rains, or late-spring and early-autumn frosts, long haulage, and distant demand. If the frontier environment cannot be supplemented, social deterioration will take place. It is not enough to push people out upon the land if the land is marginal, risky, remote. Civilisation must accompany the settler. Finally, the intending settler must have the will to succeed and he must have the capacity to adapt his musculature to new physical tasks, his mind to the possibilities of new cultural (social) experiments on the frontier, his enterprise to the potentials of the land and the region. If spirit is wanting, if security and accustomed ways are indispensable, if adventure is dead within him, the frontier is no place for him, with or without science.

New Frontiers in Old Communities.

In the United States applied science has increased agricultural production per worker, through machinery and fertilisers chiefly, and speeded transport, with the result that agriculture has become dominantly commercial and

competitive, with marked changes in crop production and type of farming in many regions. Civilisation has become increasingly urban with resulting weakening of both family ties and the neighbourhood bond. Machinery has helped create more commerce, more striking and more numerous economic successes, and a much higher standard of living for certain classes. Billboards on the highways tell youth that it is ' entitled ' to a good car, good clothes, a good time. Whether or not that entitlement was earned, what responsibilities go with it, what the advertised product will do to strengthen character or enfeeble it—these things are not put upon the billboards.

We have learned how to feed and breed animals to a high level of efficiency. We expect six thousand pounds of milk a year from a single cow to-day, whereas a hundred years ago two thousand pounds was the average. We know how to preserve food for long transportation. We successfully combat many plant enemies. We have done work upon the grasslands to preserve and improve them, upon soils to determine their rate of wastage and the extent of their need for conservation, upon fisheries as a food source for man. We have calculated the amount of ocean that will be required to sustain a man : a volume of sea water approximately equal to that of a football field covered five feet deep with water and requiring two and a half hours to filter out the zooplankton. If the result seems economically not feasible, science may yet find a way to strain sea water in the likeliest places and provide additional food. Here taste and preference may step in. Will a breakfast of copepods become popular even though we know that they are equal to the best meat in nutritive value ?

The triumphs of a scientific age have coexisting population problems of a disturbing character. In the large cities of America there are now about 7 children to 10 adults. If our present reproduction rate remains stationary these 7 children would raise 5 children and the 5 in turn would raise about $3\frac{1}{2}$. The middle class in the cities consistently diminishes its stock. By contrast, the farm population raises about 14 children to 10 adults ; the 14 would have at the present reproduction rate about 20 children and the 20 about 28. In 1937 and 1938 the ' farm-baby crop ' increased, the total for 1938 being the largest since 1926. How long and with what stock will the farm help populate the city ? Not enough children are being born to maintain the existing level of the population of the United States. Already the enrolment in the first grade of the public schools has fallen about 100,000 a year since 1930. In the six elementary grades it is declining about 200,000 a year.

It is not easy to point out offsetting conditions to farm population decline. The electrification of farm operations, the development of credit unions and producers and consumers co-operatives may restore a sense of mastery to and lay a basis for cultural participation by those who are drawn into the struggle that tends to pull good stock to the cities, there to confuse and devitalise it culturally, morally, economically. Between 1790 and 1930 our rural population increased twenty times while our city population increased three hundred times !

The play of the forces involved in these far-reaching movements and cultural changes, whether self-initiated and free or guided by government, denote a pioneer fringe of high interest in the social field. The situation needs vital leadership, courage, and local pride as well as equipment and the experimental

point of view. These are old-fashioned virtues and they imply the hard way. Can our entire population rise to such Spartan levels, to self-denying activity, to ideals of independence and strength that evoke dynamic enthusiasm ?

Individual and Group.

It is a fallacy to suppose that *group energy* is the sum of the individual energies in the group. A man does not make war : a nation or a tribe makes war. A citizen with a gun and no licence and a soldier with a gun have two quite different social prospects. A group approves group action which it may condemn in the individual. Our social ethics are not consistent with our personal standards. We are caught up by our generation in the world at large—its ideas, its wars, its conflicting loyalties.

Our culture has developed dysgenic rather than eugenic qualities. Success and its social rewards, implying unusual intellectual and other social capacities, have become linked with diminished fertility. The well-endowed are not reproducing on an adequate scale. This means a steady diminution in the supply of the inherited qualities that brought success. In so far as success is spurious or anti-social the loss of these inherited qualities need not be regretted. In so far as it represents socially valuable qualities it means continued erosion of human character and loss to the race and to civilisation.

We are wanting in general acceptance of categories of socially useful qualities. ' Eureka, I have found it ' means nothing socially until all have found it. ' The genius raids . . . the common people occupy and possess.' Whatever we gather of scientific knowledge concerning society and how it might be improved is one thing ; to persuade or to exercise control in order to bring about desired ends is quite another.

We say that youth should be taught to acquire power to adjust itself to associative living. To a large extent this means the acceptance of the standards of contemporary society, the routine encouragement in one's self of that which society encourages. To carry this out to the fullest extent might be to destroy individual gifts and powers. Social living is not all ! Will society foster or permit the not-understood individual variations that include the genius ?

The supposition that scientific discovery can be made to bear immediately upon social change, the scientist remaking society, seems faulty doctrine. ' Society ' is built upon beliefs, traditions, prejudices, suppositions, and philosophies, as well as facts, institutions, inventions, and materiel—all supported by power or force exercised through *time*. Every advance in applied science calls for a tighter and more inclusive social organisation, and it is the state which inevitably controls that organisation. In exercising its controls, the state (consisting of determined *groups of men* who hold power, no less than accepted but precarious forms of controls, institutions, and the like) may introduce only those discoveries that suit its book. The holders of power, to whom power is the first law, will scarcely legislate themselves out of office. Moscow, Berlin, London, and Washington are alike in this respect.

What is unlike in these four countries is a far more profound thing—the relative degree of freedom for the individual in finding and proclaiming scientific discoveries and in *advocating* their social applications or acceptance. The fight for adoption or rejection of ideas is in the open social arena in

democratic countries. If there are dangers we are free to denounce them : no philosophic theory of society stands in the way. By contrast, if it suits the dictator to rest his social argument upon the powerful effects of an improvised environment he rejects the findings of geneticist and eugenist and even a Vavilov loses his job. To be secure as a scientist in a totalitarian country one must first ask a political bureau what is sound.

Let no one suppose, however, that democracy ensures continued freedom. Only when democratic social control of economic life is fully extended shall one be able finally to test the hypothesis that freedom of learning can live in the house of democracy. If the gap between ' knowledge ' and folk thinking gets too wide we shall all have to turn to the forging of a common method of thought, with no small risk to be run that a sterile generaliser with power may impose a philosophy. This makes the conservation and freedom of the minority a vital need : how often has a single vigorous challenge saved a human situation !

Planning involves Risk.

The tentative nature of social conclusions is often a deciding factor in the rejection of scientific findings. Rightness is not proved except through social experiment that is jeopardised by too short a period of trial, by misrepresentation and misunderstanding of effects, by the fact that the objects of experiment, men and women, care for different kinds of outcome and such caring may change the outcome. Speed in social reform itself creates a kind of road hazard because of unpredictable turns and their effects, unforeseen impacts and disturbances.

The long view and the short view are difficult to distinguish—a further complication. To preserve our civilisation we strengthen our nation, pointing to the competitive situation in the world at large. Through national planning we seek to raise the level of health and strength, to solidify national interest. This will inevitably have the effect of intensifying international competition. Commerce is increasingly competitive and necessarily implies inequality of opportunity in specific lines. In a wide sense commerce is the mother of all wars.

In the international field the triumphs of increased home production, ersatz, and autarchy, hailed one by one as proof of growing independence and enhanced welfare—all are advantages that are bought at the price of dislocations elsewhere. Many a national triumph implies a setback for some other nation.

Identification of Causes precedes Control.

Social pioneering has to do with culture in the making, with environment that becomes understood by thinking about the conditions of trial and the effects of error. It deals with inevitably new social forms or old forms adapted to new situations, and becomes ever more complex and overpowering for the individual. Faced by an emergency we develop emergency measures only to find ourselves shackled indefinitely by the emergency forms which we set up, ' thereby covering up the conditions that necessitate them.'

The first duty of an intelligent society in the modern scientific period is to get at the causes of things. The increase in the general consciousness that

wonders exist, that science can create marvels, and that science supplies valuable elements in social living is a gain of the first importance. It has taught whole peoples to look for causes or to expect that causes will be found. Man's greatest hope lies that way to-day. Once causes are located there is no guarantee that a situation produced by a given cause may come to human control. But there is at least *a chance*! Any gains made in this field have appealing potentialities: a basic discovery generally leads to a host of derivative discoveries.

The scientific method is needed nowhere so much as in the sorting of causes and the delimitation of the action of forces supposed to be at the root of our troubles. The United States Bureau of Investigation reminds the Boy Scouts that though they number 1,281,000 they are outnumbered four to one by the 4,750,000 murderers, thieves, burglars, embezzlers, arsonists, kidnappers, extortionists, and other criminals. Equally the criminal hosts outnumber the college population of 1,200,000. The director of the Bureau does not find the cause of this appalling condition in science: he points to the skulking despoilers and modern-day pirates, 'the venal and corrupt politicians' who place personal profit above the rights of decent citizens. But what does he find in the decent citizens themselves? Apathy, lack of interest in honest law enforcement, laziness in the exercise of the power of the ballot. The underworld counts upon these qualities!

A recent advocate of 'glandocracy' contends that a society is as good or as bad as its nervous system and its glands, which together make an integrating mechanism whose character profoundly conditions the individual and his attitude towards the society of which he is a part. Given a harmoniously integrated development and the instinctive reactions to good social conditions are more likely to be adaptive and harmonious. Too simplified and mechanical an explanation, one may say. But in any event science deepens the understanding of basic conditions, and searches endlessly for causes in the hope that once they are found a clue to control may follow.

Breaking the Frame.

In man's endless adventure in progress, are the objectives to be great works of art, literature and science, or the development of personal health, strength, and hardihood joined to national conquest, thereby exalting the nation at the expense of the individual? Or is it sufficient to promote the glory of God by confession, by religious adoration?

Modern science is not without its infective transcendentalism. 'Our destiny is in our hands . . . develop all [our] potential activities . . . reject all systems,' says Carrel, who believes we can achieve almost illimitable social advance if we but give scope to feeling and genetic possibilities. He advocates resistance to 'the tyranny of the quantitative.' He would break the frame of the school, the factory, and the office, and reject the very principle of technological civilisation: mechanical inventions but hinder human development. This seems to overlook certain prime and as yet ineradicable troubles of mankind, such as divergent and conflicting aims, faults of organisation, lack of wide social participation in the findings of science.

How resolve the conflicts between classes, reduce the arrogance of

nationalism, and diminish the chances of war? Which class is to benefit most from a given programme, which nation? Are these questions any nearer settlement because of our present wealth of scientific knowledge? Would more scientific knowledge decide the correct and just apportionment of advantages and privileges and accessions to the forces that raise the standard of living? Without modern scientific knowledge would acceptable solutions be any nearer?

Justice to conflicting groups requires either agreement between them or a universal judge. Our sympathies are weak when we try to put ourselves in the places of men who are far away. We rationalise our own acts to make them good to us and those of the enemy to make them bad. When we fight for the good against the bad it is war nevertheless. Science should provide an even-tempered attitude, but it seems almost superhumanly difficult to cultivate it in society.

We believe in scientific progress, but we reject the findings of science if they disturb an existing going concern, a satisfied community, an assured communication method. We can see only a little way ahead. This produces caution in some. Others exclaim, ' if there are remote consequences let our progeny struggle with them.' To feed unemployed people we incur a debt. We assume that the fed are worth feeding, knowing that a good deal of unemployment is non-discriminatory. We say that a minimum degree of support is required for an unemployed person, but is not ' minimum ' determined by worth? If we needed more people would not ' worth ' rise? Will our children be willing to use the lesser wealth of their time to pay for the judgments of our time? Or do we act like the worker wasp that, when the food supply runs low, bites off the tail of the grub to feed to its head?

In the midst of our troubles, the endless search for simplicities goes on! The despairing layman's answer to the complexities of phenomenonology and doctrine is to set up or accept a new doctrine that is simple and clear and based on authority. There is a clamour for simplicity in economics, politics, and education. One hundred books will educate you and all educated men will then talk alike; a formula can surely be found to break down the barriers to unemployment; if all nations would embrace the principle of world co-operation we should have peace. Editorials, columnists' comment, articles, adjuration, philosophies, tend toward simplicities: ha! here at last is the prophet who has found a way!

There seems to be no straight path to a social goal; evolution seems chancey; progress is only a fitful by-product, says the despairing observer. Our loyalties waver, our beliefs change, our confidence in accepted democratic methods is impaired as we observe the wide variation of intelligence, the difficult task of sustaining interest in community affairs, the low level of individual satisfaction, the little knowledge we have of our leaders, the prime difficulty of bringing democratic method down from a glowing historical abstraction to a concrete activity, the inevitable performance of many functions of government by individuals employing their own judgment, the large element of guesswork in all forms of experiment, including social pioneering, the difficulty in distinguishing between true and false results in short or long periods of time, the haphazardness, the waywardness, the *lack* in democratic judgments, perceptions and actions. To offset these tendencies we offer education, more

science rather than less, and ' a documented call for action ' based upon agreement as to facts by social scientists. Little enough, one must admit.

Analysis and Advance.

Social forms cannot keep pace with creative thought. A time lag is inevitable because we have found no way to teach and test ideas except through time-consuming and often inconclusive experience. No one subject of study is capable of solving the total array of problems of a people. Science is no more deficient in this respect than social studies themselves. Hear an economist : ' Economics is not the science of welfare . . . it is concerned with the relationships of scarce means to given ends.' Economists may formulate economic policies through the application of reason and systematic thought to a limited field of human relations ; but economics cannot provide a total social programme, continues Mackintosh. Even the data and hypotheses of economics are limited to a particular age. The subject tends to become less general in its application, a doctrine rather than a science.

In the last quarter of the nineteenth century, modern economic analysis (Marshall, Jevons, Menger and Walras) found a tool of investigation whose focus is the principle of equilibrium and its use has been continuously extended ' to attack equally problems of disequilibrium.' When the economist is finished with his statistical analysis, he adds imagination, experience and reason to create and test his hypotheses. Are there institutions to carry out an indicated policy ? Will the democratic group for which it is designed understand it, accept it, and expand it to fit changing conditions ? The ends that society has in view are constantly changing and only rarely are they precisely defined. The problems themselves are complex and so, too, are the methods by which they will be solved, whereas public attention is short-lived and public analytical power is extremely limited.

Directives and Limits.

From the evidence of palæontology chiefly it was discovered that life from the first had both plasticity and the potentiality of change. Whatever the underlying causes and mechanisms, increasing complexity of form and function has been life's mode. Both muscular and psychological complexity has given organisms increased power (efficiency) in the *use* of the physical environment. Will the process stop with defeat at the physical and psychological assembly known as man, or will the conscious human turn his unique power of understanding upon himself, both as an individual and as part of a social mechanism ?

Faith and method joined to imagination and curiosity, still lead us on. Science is the greatest inciter of hope that we know—rational hope that the triumphant methods that have given us deeper understanding and increased efficiency as biological and social mechanisms, will one day give us a still deeper insight into who and what we are and what we may become when rational control is extended. As in art and religion so in science—new meanings evolve as the mind continues its unshackling process. The eternal is not brought down from aloft only : it is also sought out and raised up among men. Science is one way of acquiring a knowledge of meanings or of adapting or inventing meanings that give deep human satisfaction—for a time.

INDEX

1939—40

Roman numerals preceding page-references indicate the parts of the Advancement of Science in which references will be found.

Titles of communications are frequently abbreviated.

Accommodation coefficients, by Prof. T. Alty, II, 218

ADAMS, Dr. T., Economic aspects of urban concentration, III, 394.

Agricultural education, discussion, II, 311.

Air furnace melting for blackheart malleable cast iron, by H. G. Cochrane, II, 287.

Air photography and the Ordnance Survey, by Lieut.-Col. R. Ll. Brown and Capt. E. H. Thompson, II, 272.

AITKEN, Dr. A. C., Irreducible homœomorphs in the linear group, II, 196.

Alexander Pedler Lecture, 1940, by Prof. A. Ferguson, IV, 469.

Algal limestones in the Calciferous Sandstone Series of East Fife, by F. W. Anderson, II, 259.

ALTY, Prof. T., Accommodation coefficients, II, 218.

Aluminium, light alloys of, by Prof. A. von Zeerleder, II, 219.

Aluminium alloys, constitution of, by Dr. A. G. C. Gwyer, II, 219.

Anaerobic respiration of potato tubers, by J. G. Boswell, I, 105.

Analysis of industrial skill by motion study, by Miss I. J. Blain, III, 444.

Ancient metal objects, report, I, 122.

ANDERSON, Dr. A. O., Prospects of advancement of knowledge in early history of Scotland, I, 77.

ANDERSON, Dr. E. M., Raised beaches of the Forth and Tay, II, 254.

ANDERSON, F. W., Algal limestones in the Calciferous Sandstone Series of East Fife, II, 259.

—— Ostracod zones in the Wealden and Purbeck beds, II, 259.

—— Raised beaches of the Forth and Tay, II, 256.

ANDERSON, M. L., Silviculture of the larches, I, 114.

Animal indicators of Atlantic flow into North Sea, by J. H. Fraser, I, 44.

Animal population studies, by Dr. D. S. Maclagan, I, 51.

Anthropoids, Affinities of South African Pleistocene, by Dr. R. Broom, I, 80.

Anthropology, scope and limitations of physical, by Prof. W. E. Le Gros Clark, I, 52.

Anthropology in education, discussion, I, 83.

Antidunes in geology, by Dr. A. Lamont, II, 253.

APPLETON, Dr. E. V., Solar and terrestrial relationships, general survey : radio effects, II, 199.

Application of economic botany in the tropics, by Sir F. Stockdale, I, 109.

Aptitudes migratrices et capacités affinitaires des radicaux non-saturés dans les transpositions moléculaires, by Prof. M. Tiffeneau, II, 220.

ARMSTRONG, A. L., New discoveries at Grimes Graves, I, 75.

Artemia Salina, report, I, 116.

ASPREY, Dr. G. F., Vegetation of the Isle of Canna, I, 106.

Assessment of physical fitness, by Prof. D. Burns, III, 399.

Atlantic grey seal, by Dr. F. Fraser Darling, I, 51.

Atmospheres of the planets, by Dr. H. Spencer-Jones, III, 450.

Auroral phenomena and the physics of upper atmosphere, by Prof. L. Vegard, II, 200.

AWBERY, J. H., Heat capacity of iron and carbon steels, II, 195.

BACON, Prof. F., Simple models for the study of engineering, II, 287.

BAILY, Prof. F. G., River pollution, II, 319.

Ballads and tunes which travel, by Prof. W. J. Entwistle, I, 77.

BANKS, Mrs. M. M., Folklore of net, line, baiting, and boat in N.E. Scotland, I, 82.

BARKER, Dr. S. G., Science of jute, II, 321.

BARTLETT, R. J., Measurement in psychology, III, 422.

Basalt magma, trend of fractional crystallization of, by L. Wager, II, 259.

BAUER, S. G., Ignition lag in compression ignition engines, II, 287.

BEACHAM, A., Coal Mines Act, 1938, III, 398.

BEADLE, L. C., Biology of some saline waters in northern Sahara, I, 49.

Beakers in Spain, types and chronology of, by Dr. P. Bosch-Gimpera, I, 76.
BELL, O., Public tastes and the entertainment film, III, 443.
BENNET, Dr. E. A., Methodology in psychological medicine, III, 446.
BIRCH, Dr. S. F., Catalytic isomerisation of paraffins, II, 221.
Bird's skeleton, mechanics of, by Sir D'Arcy Thompson, I, 48.
BLACKWELL, Miss E. M., Life-cycle of *Blastocladia Pringsheimii* Reinsch, I, 110.
Blaen Brefi, post-glacial history of, by E. G. Davies, I, 108.
BLAIN, Miss I. J., Analysis of industrial skill by motion study, III, 444.
Blastocladia Pringsheimii Reinsch, life cycle of, by Miss E. M. Blackwell, I, 110.
Blood groups, report, I, 124.
BOND, Dr. G., Excretion of fixed nitrogen from leguminous root nodules, I, 105.
BORN, Prof. M., New theory of fusion based on lattice dynamics, II, 194.
BOSCH-GIMPERA, Dr. P., Types and chronology of beakers in Spain, I, 76.
BOSWELL, J. G., Anaerobic respiration of potato tubers, I, 105.
BOWEN, G, Sheep and cattle ranching in Western North America, II, 274.
BOWIE, Dr. J. A., Education as a preparation for industry, IV, 479.
BOWLEY, Dr. M., Housing in Scotland, III, 394.
BOWMAN, Dr. I., Science and social pioneering, IV, 552.
BRAMBELL, Prof. F. W. R., and H. A. COLE, Phylogenetic significance of a new preoral ciliary organ found in Enteropneusts, I, 52.
Breeding and feeding of beef cattle, by A. Howie, II, 310.
Bronze age, connections between the Lake District and Ireland during, by Miss C. Fell, I, 75.
BROOM, Dr. R., Affinities of South African Pleistocene anthropoids, I, 80
BROWN, Lieut.-Col. R. Ll., and Capt. E. H. THOMPSON, Air photography and the Ordnance Survey, II, 272.
BROWNE, Sir Buckston, birthday greeting from officers, IV, 469.
BUSEMANN, Dr. A., Effect of compressibility on thin slightly cambered aerofoils at sub-sonic speeds, II, 193.
BUTCHER, Dr. R. W., Effects of river pollution on the freshwater flora, ii, 320.

CAIRNCROSS, A., and G. E. TEWSON, Finance of new enterprise in Scotland, III, 396.
Calcium in natural waters, by Dr. J. D. Robertson, I, 50.
Cambrian Trilobites in Highland Border rocks near Callander, by Dr. J. Pringle, II, 252.
CAMPBELL, Capt. G. I., Forestry in Scotland, I, 114.
CAMPBELL, Col. R. B., Psychological aspect of physical education, III, 421.
CAMPBELL, Dr. R., Raised beaches of the Forth and Tay, II, 255.
Canna, Vegetation of the Isle of, by Dr. G. F. Asprey, I, 106.
CANTON, Miss E. M., Autecology of *Rhyncospora alba*, I, 108.
Carbon dioxide evolution and cocarboxylase, by Dr. S. Ochoa, II, 216.
Carboniferous rocks at Bridge of Awe, by Dr. J. Pringle and Dr. M. Macgregor, II, 252.
Carboniferous seed-type from Tantallon, by Prof. W. T. Gordon, II, 251.
CARPENTER, Dr. K., Seasonal rhythm in feeding of salmon parr in Cheshire Dee, I, 48.
CARRICK, J., Physiology of a new species of Stemphylium, I, 112.
CARTER, D., Dyeing of jute, II, 321.
Catalytic isomerisation of paraffins, by Dr. S. F. Birch, II, 221.
CAVALCANTI, A., Propaganda by films, III, 442.
CHADWICK, Mrs. N. K., Spiritual journeys of the seer, I, 78.
CHALONGE, Dr. D., Astrophysical observations, II, 198.
CHAPMAN, F. T., Education in industry: part-time education outside the works, IV, 479.
Chromatic behaviour of freshwater eel, by H. Waring, I, 49.
CLARK, Dr. R. S., Movements of herring larvæ, I, 44.
CLARK, Prof. W. E. le Gros, Scope and limitations of physical anthropology, I, 52.
CLEMENTS, R. G. H., Design of roads, II, 287.
CLOUGH, Brig. A. B., New programme of the Ordnance Survey, II, 272.
Coal Mines Act, 1938, by A. Beacham, III, 398.
COCHRANE, H. G., Air furnace melting for black-heart malleable cast iron, II, 287.
COCKERHAM, Dr. G., Virus diseases and seed potatoes, II, 313.
COLLIER, A., Social economy of crofting districts, III, 395.
COLLIER, D. E., Spens Report, IV, 481.
COMBER, Prof. N. M., Agricultural education, II, 311.
Contacts of religion and science, by Sir R. Gregory, II, 163.
Contribution of physical education towards physical fitness, by Miss H. Drummond, III, 421.
Council, meeting, January 5, 1940, II, 161; Report, 1938–39, I, 128.
Crane dance, by Prof. P. E. Newberry, I, 81.
Crofting districts, social economy of, by A. Collier, III, 395.
Cytochrome and similar compounds, by Prof. D. Keilin, II, 215.
Cytology of parthenogenesis in *Potamopyrgus jenkinsi* Smith, by Dr. Ann R. Sanderson, I, 46.

DARBYSHIRE, G. L., Education in industry: industrial concerns, IV, 479.
DARLING, Dr. F. FRASER, Atlantic grey seal, I, 51.
DART, Prof. R., Recent discoveries bearing on human history in South Africa, I, 81.
DAVIES, E. G., Post-glacial history of Blaen Brefi, I, 108.
DAVEY, R., Forestry for game, I, 115.

DAVIDSON, C. F., Raised beaches of the Forth and Tay II, 255.
DAVISON, E. H., Solubility of rocks, II, 258.
DAVY, Dr. J. BURTT, Geographical distribution of some African groups of woody plants, I, 112.
DAY, W. R., Diseases of larch, I, 114.
Derbyshire Caves, report, I, 125.
DESCH, Dr. C. H., Light alloys, II, 219.
DEVEREUX, W. C., Industrial research methods of light alloys, II, 220.
DICKENS, Dr. F., Tissue respiration, II, 215.
DITCHBURN, Prof. R. W., Laboratory experiments on continuous absorption of light, II, 197.
Division for the Social and International Relations of Science, report, 1938–39, I, 133.
DIX, Dr. EMILY, Sections in the Warwickshire coalfield, II, 253.
DIX, Dr. EMILY, and W. D. WARE, Similis-Pulchra Zone in the Pembrokeshire coalfield, II, 252.
DIXON, Dr. M., Catalysis in tissue respiration, II, 214.
Domesday Cheshire, geography of, by Miss D. Sylvester, II, 275.
DOUGLAS, Dr. G. P., Future developments in high-speed flight, II, 192.
DOUGLAS-HAMILTON, Rt. Hon. Lord N., Special Areas in Scotland, III, 396.
Down House, report, 1938–39, I, 132 ; closure to public and uses during war, I, 8 ; reopening of garden, III, 380.
DOWNIE, Dr. D. G., Germination and development of *Goodyera repens*, I, 107.
DOYLE, Prof. J., Further observations on pollination in Pinaceæ, I, 112.
DRUMMOND, Miss H., Contribution of physical education towards physical fitness, III, 421.
Dundee and District, scientific survey of, Appdxs. I, II, III.
Dundee Meeting, narrative I, 7 ; membership numbers I, 10 ; loyal message and reply, I, 10.

Earn and Tay, evolution of rivers, by D. L. Linton, II, 273.
EASTHAM, J. K., Economic problems of the jute industry, II, 321.
EDDINGTON, Sir A., Radford Mather Lecture, IV, 470.
Edinburgh, internal geography of, by A. J. Hunt, II, 272.
EDINGTON, Dr. G. H., and Miss A. E. MILLER, Ulna in birds, I, 48.
EDRIDGE-GREEN, Dr. F. W., Double function of the ocular muscles, III, 422.
Education, report on informative content of, IV, 482.
Education, report on research in, IV, 533.
Education as a preparation for industry, discussion, IV, 478.
Education for industry, by Dr. A. P. M. Fleming, IV, 471.
Education in industry, discussion, IV, 479.
Educational research in Scotland, discussion, IV, 480.
Ego in his world, the, by Prof. K. Koffka, III, 444.
Éire, current movements of population in, by T. W. Freeman, II, 274.
Electron optics and television, by Dr. V. K. Zworykin, II, 191.
ELKIN, H. A., and W. A. S. WHITE, Rot-proofing of jute, II, 321.
Elm, distribution of British species and local races of, by Dr. R. Melville, I, 109.
Elodea canadensis, effect of salts and other substances on respiration of, by Dr. R. F. Jones, I, 106.
Emulsification of batching oils, by A. King, II, 321.
Engineering workers, selection of skilled, by P. Smith, III, 443.
Enteropneusts, phylogenetic significance of a new preoral ciliary organ found in, by Prof. F. W. R. Brambell and H. A. Cole, I, 52.
ENTWISTLE, Prof. W. J., Ballads and tunes which travel, I, 77.
Eriocaulon septangulare With., by C. Leighton Hare, I, 108.
EVANS, Dr. E. ESTYN, Lyles Hill, I, 76.
Evolution of the human brain, by Dr. S. Zuckerman, I, 81.
Excretion of fixed nitrogen from leguminous root nodules, by Dr. G. Bond, I, 105.
Exports and imports in the trade cycle, by J. H. Wilson, III, 399.
EYLES, V. A., Boundary between Old Red Sandstone and the Carboniferous, II, 258.

FELL, Miss C., Connections between the Lake District and Ireland during the Bronze Age, I, 75.
FERGUSON, Prof. A., Alexander Pedler Lecture, IV, 469.
Fife experiments in agricultural education, by G. MacGregor, II, 311.
Film reactions as a new approach to biology, by Prof. E. K. Rideal, II 201.
Films, exhibition of biological, I, 48.
Films, session on, III, 442.
Finance of new enterprise in Scotland by A. Cairncross and G. E. Tewson, III, 396.
FINLOW, R. S., Production of jute, II, 321.
FISHER, Prof. A. G. B., Socialism and material progress, III, 397.
FISHER, Dr. K., Education as a preparation for industry, IV, 479.
FISHER, Prof. R. A., Nutrition and physique, I, 79.
Flavoproteins, by Dr. H. Theorell, II, 214.
FLEMING, Dr. A. P. M., Education for industry, IV, 471.
FLEURE, Prof. H. J., Anthropology in education, I, 83.
Flight, problems of high-speed, discussion, II, 192.
Flow of liquids through beds of granular solids, by W. H. Ward, II, 287.
Flying, the future of, by H. E. Wimperis, II, 277.
FOGG, W., Human geography of the Spanish zone of Morocco, II, 274.
—— Wares of a Moroccan native doctor, I, 78.
Folk lore of death cairns, by Miss M. McNeill, I, 82.
Folklore of net, line, baiting and boat in N.E. Scotland, by Mrs. M. M. Banks, I, 82.
Folklore, Scottish, and its origins, by Rev. Canon J. A. MacCulloch, I, 82.

Food of freshwater fishes with special reference to the Tweed, by Miss I. Limbert, I, 50.
Forestry for game, by R. Davey, I, 115.
Forestry in Scotland, by Capt. G. I. Campbell, I, 114.
Forth, buried channel of the, by Dr. M. Macgregor, II, 253.
Fossil fishes of the ' Caledonian ' Old Red Sandstone, by Dr. T. S. Westoll, II, 256.
FRASER, J. H., Animal indicators of Atlantic flow into North Sea, I, 44.
FRASER, Prof. L. M., What is socialism ? III, 397.
FREEMAN, T. W., Current movements of population in Éire, II, 274.
Freshwater Biological Station, report, I, 122.
Freshwaters, research, by Dr. E. B. Worthington, I, 50.
FRIBERG, Dr. N., Development of highways in Sweden, II, 273.
FRIZELL, J. B., Spens Report, IV, 481.
Frustration, experimental approach to psychology of, by Dr. H. L. Philp, III, 449.
Frustration, need-persistive and ego-defensive reactions to, by Dr. S. Rosenzweig, III, 449.

Gastro-intestinal tract, dual mechanism of pain and disease of, by Prof. J. Morley, III, 419.
General Committee meeting, Jan. 5, 1940, II, 161.
General Treasurer's Report, 1938–39, I, 139.
Geographical distribution of some African groups of woody plants, by Dr. J. Burtt Davy, I, 112.
Geological photographs, report, II, 349.
Geological sections, preservation of, by Dr. M. Macgregor, II, 318.
Geology of the Dundee district, by Prof. D. E. Innes, II, 251.
GEORGE, Prof. T. N., Boundary between Old Red Sandstone and the Carboniferous, II, 257.
GILBERT, J. C., Investment Trusts in Dundee, III, 398.
GLAZIER, E. V. D., Inductor with air-gapped magnetic circuit, II, 287.
GODDEN, W., Pre-digestion of coarse fodders, II, 311.
GOLDSWORTHY, Capt. E. C., Voith-Schneider system of propulsion, II, 287.
Goodyera repens, germination and development of, by Dr. D. G. Downie, I, 107.
GORDON, Prof. W. T., Boundary between Old Red Sandstone and the Carboniferous, II, 257.
—— New Carboniferous seed-type from Tantallon, North Berwick, II, 251.
—— Preparation of scientific papers for communication and publication, II, 318.
GRAHAM, A., Royal Commission on Ancient Monuments (Scotland), I, 78.
GRANT, Miss I. F., Human interests of an exhibit in a Highland folk-collection, I, 76.
Grass conservation, discussion, II, 312.
Grassland in modern food production, by Martin Jones, II, 312.
GRAY, Dr. L. H., and Dr. J. READ, Neutron generator for biological research, II, 192.
GREAVES, Prof. W. M. H., Surface temperatures of stars, II, 197.
GREAVES, Prof. W. M. H., 27-day recurrence tendency of magnetic storms, II, 200.
GREGOR, Dr. J. W., Experimental taxonomy ; specific and infra-specific categories, I, 107.
GREGORY, Sir R., Contacts of religion and science, II, 163.
GREIG, Dr. J., and E. FRANKLIN, Non-linear distortion in iron testing, II, 287.
GRIER, Miss L., Spens Report, IV, 481.
GRIFFITHS, Dr. E., Recent advances in high-temperature technique, II, 194.
Grimes Graves, by A. L. Armstrong, I, 75.
Group intelligence tests, reliability of, by H. McRae, III, 446.
GWYER, Dr. A. G. C., Constitution of aluminium alloys, II, 219.

HALL, R. L., Problems in international economics for socialists, III, 397.
HARDIE, J. L., Training the mind, III, 448.
HARE, C. LEIGHTON, *Eriocaulon septangulare* With., I, 108.
HATFIELD, Dr. W. H., Modern steel metallurgy, II, 194.
HAWES, R. S., Eye and light reactions of Proteus, I, 52.
HAWKINS, Prof. H. L., Local scientific societies and the community, II, 314.
HAYWARD, Miss I. M., Tweeddale and the Borders (Film), I, 113.
Hebrews, change of personal name among biblical, by Prof. A. M. Honeyman, I, 79.
Hebridean music, by Mrs. C. Mackintosh, I, 77.
HEMINGWAY, Prof. A., and H. R. NOLTIE, Respiratory exchange measured during distance running, III, 421.
HENSHALL, A. E., Spens Report, IV, 481.
HEPBURN, W. A. F., Recent educational research in Scotland, IV, 481.
HERBERT, T. M., Industrial research, IV, 480.
Herring larvæ, by Dr. R. S. Clark, I, 44.
HETTINGER, Dr. J., Ultra-perceptive faculty, III, 450.
HICKLING, Prof. G., Boundary between Old Red Sandstone and the Carboniferous, II, 257.
Highland folk-collection, by Miss I. F. Grant, I, 76.
High-temperature physics, discussion, II, 194.
Hoatzin, embryology of, by C. W. Parsons, I, 48.
HOGBEN, Prof. L. T., and F. W. LANDGREBE, Visual acuity in fishes, I, 49.
HONEYMAN, Prof. A. M., Change of personal name among biblical Hebrews, I, 79.
HOTOPF, W. H. N., Some relations between characteristic interests of school-boys, III, 446.
Housing in Scotland, by Dr. M. Bowley, III, 394.
HOWE, A. B., Television outside-broadcasts, II, 191
HOWIE, A., Breeding and feeding of beef cattle, II, 310.
HUGGINS, K.H., Town development in Scotland, II, 271.
HULME, Dr. H. R., Surface temperatures of stars, general physical theory, II, 198.
HUNT, A. J., Internal geography of Edinburgh, II, 272.

Ignition lag in compression ignition engines, by S. G. Bauer, II, 287.
Inductor with air-gapped magnetic circuit, by E. V. D. Glazier, II, 287.
Industrial research, discussion on aspects of, IV, 480.
Industry, localisation and concentration, by A. J. Wensley, III, 394.
Informative content of education, report, IV, 482.
INGLIS, Dr. W. B., Children and entertainment films, III, 442.
INNES, Prof. D. E., Geology of the Dundee district, II, 251.
Instruments in science and industry, by R. S. Whipple, II, 175.
Intramolecular change involving the migration of groups, discussion, II, 220.
Intramolecular rearrangement, general type of, by Dr. T. S. Stevens, II, 222.
Intra-thecal alcoholisation, by T. F. Todd, III, 420.
Investment Trusts in Dundee, by J. C. Gilbert, III, 398.
Irreducible homocemorphs in the linear group, by Dr. A. C. Aitken, II, 196.
Isotopes as atom indicators for reactions in solution, by Prof. W. F. K. Wynne-Jones, II, 218.

JACKSON, Prof. W., Education in industry : post-advanced work, IV, 480.
—— University engineering courses, II, 287.
JACOB, T. K. T., Cytological evolution in Sesbania, I, 113.
JAMES, Prof. E. O., Primitive cults in the religion of the New Testament, I, 76.
JONES, B. MOUAT, Education as a preparation for industry, IV, 479.
JONES, Dr. H. Spencer, Atmospheres of the planets, III, 450.
JONES, Martin, Grassland in modern food production, II, 312.
JONES, Dr. R. F., Effect of salts and other substances on respiration of *Elodea canadensis*, I, 106.
Jute, special session on, II, 320.

KEILIN, Prof. D., Cytochrome and similar compounds, II, 215.
KENNEDY, Dr. W. Q., Boundary between Old Red Sandstone and the Carboniferous, II, 257.
KERR, R., Wooden teapots, from Kongbo province, Tibet, I, 82.
KERR, Prof. W., Grass conservation, II, 313.
KING, A., Emulsification of batching oils, II, 321.
KNIGHT, R., Training the mind, III, 448.
KNOX, Prof. T. M., Palm oil industry, II, 273.
KOFFKA, Prof. K., The ego in his world, III, 444.
KREBS, Dr. A. H., Tissue respiration, II, 215.

LAMONT, Dr. A., Antidunes in geology, II, 253.
Larches, discussion, I, 114.
Late Glacial remains of reindeer in Glasgow district, by Prof. J. Ritchie and Dr. M. Macgregor, II, 254.
Lattice dynamics, new theory of fusion based on, by Prof. M. Born, II, 194.
Laundries, study of the sorting process in, by Miss M. M. Mellis, III, 444.
LAWRENCE, Dr. J., Biological and medical investigations with neutrons and radioactive substances, II, 191.
LEITCH, Dr. I., Nutrition and physique, I, 80.
LEWIS, Dr. M. M., Psychology of language, III, 447
LEWIS, Dr. W. B., Production and properties of radio-elements, II, 191.
LEWIS, W. V., Plucking as a factor in glacial valley erosion, II, 276.
Light alloys, discussion, II, 219.
LIMBERT, Miss I., Food of freshwater fishes with special reference to the Tweed, I, 50.
LINTON, D. L., Evolution of the rivers Earn and Tay, II, 273.
Local scientific societies and the community, by Prof. H. L. Hawkins, II, 314.
LOCK, C. N. H., Problems of high-speed flight as affected by compressibility, II, 193.
LONGMUIR, J. B., Education in industry : industrial concerns, IV, 479.
LUBBOCK, D. M., Nutrition and physique, I, 80.
LUCAS, C. E., Ecology of plankton in North Sea, I, 45.
Lyles Hill, by Dr. P. Estyn Evans, I, 76.
LYTHE, S. G. E., Population changes in the Lower Tay Valley since 1755, II, 275.

MCCLELLAND, Prof. W., Recent educational research in Scotland, IV, 480.
MACCOLL, Dr. J. W., Theoretical aspects of high-speed flow, II, 193.
MACCULLOCH, Rev. Canon J. A., Scottish folklore and its origins, I, 82.
MACDONALD, J. A. B., Larches on peat and poor Calluna types, I, 114.
——, Sowing, weed control and some other nursery problems, I, 115.
MAGE, Dr. C. A., Training the mind, III, 448.
MACFARLANE, P. R. C., Homing instinct of salmon, I, 47.
MACGREGOR, G., Fife experiments in agricultural education, II, 311.
MACGREGOR, Dr. M., Boundary between Old Red Sandstone and the Carboniferous, II, 256.
—— Preservation of geological sections, II, 318.
—— Raised beaches of the Forth and Tay, II, 255.
—— The buried channel of the Forth, II, 253.
MCINTOSH, Dr. T., Importance of variety in potato production, II, 313.
MACKAY, A., Films in Schools, III, 442.
MCKENZIE, Prof. A., and Dr. R. ROGER, Intramolecular change involving the migration of groups, II, 220.
MACKINTOSH, Mrs. C., Hebridean music, I, 77.
MACLAGAN, Dr. D. S., Animal-population studies, I, 51.
MACMILLAN, Dr. W. G., Swelling of jute fibres, II, 321.
MCNEILL, Miss M., Folklore of death cairns, I, 82.
MCRAE, H., Reliability of group intelligence tests, III, 446.
MCSWINEY, Prof. B. A., and Dr. B. M. UNKAUF, Visceral afferent fibres, III, 419.

MADGE, Dr. M. A. P., Zoospore formation in a species of Stigeoclonium, I, 110.
Magnetic storms, 27-day recurrence tendency of, by Prof. W. M. H. Greaves, II, 200.
MAJUMDAR, G. P., Protoxylem vessels in Heracleum, I, 105.
MALCOLM, Miss M. C., Sawfly parthenogenesis, I, 46.
MALLOCH, W., River pollution and freshwater fisheries, II, 320.
MANN, Dr. T., Tissue respiration, II, 216.
Mathematical tables, report, II, 327.
Matrix theory in its geometrical aspect, by Prof. H. W. Turnbull, II, 196.
MATTHEWS, R. B., Mechanics, of towing road vehicles, II, 287.
MAYO, Major R. H., Trans-Atlantic air service, II, 287.
Measurement in psychology, by R. J. Bartlett, III, 422.
Mechanics, discussion on teaching of, II, 196.
MELLIS, Miss M. M., Study of the sorting process in laundries, III, 444.
MELVILLE, Dr. H. W., New lamps for old, II, 220.
—— New technique in physical chemistry, II, 217.
—— Photochemistry, II, 218.
MELVILLE, Dr. R., Distribution of British species and local races of elm, I, 109.
MENZIES, W. J. M., Salmon migrations, I, 47.
MEREDITH, Prof. H. O., Rates and taxes, III, 381.
Metamorphism and igneous action, by Prof. H. H. Read, II, 223.
Methodology in psychological medicine, by Dr. E. A. Bennet, III, 446.
MIDDLETON, Sir T., Practice with science, II, 288.
MILLS, Dr. A. K., Stereochemistry of intramolecular change, II, 221.
MILNE, Prof. E. A., Teaching of mechanics, II, 196.
Mining sites in Wales, early, report, I, 126.
Models for study of engineering, by Prof. F. Bacon, II, 287.
MOIR, Prof. J., Uterine pain, III, 420.
MORLEY, Prof. J., Dual mechanism of pain in disease of the gastro-intestinal tract, III, 419.
Moroccan native doctor, wares of, by W. Fogg, I, 78.
Morocco, human geography of the Spanish zone, by W. Fogg, II, 274.
MORTON, J. W., Reaction of retinal pigments to coloured light, I, 49.
Morvern, Argyll, physical and human geography of, by Dr. J. F. Scott, II, 276.
MURPHY, Prof. J., Primitive character of poetic genius, III, 445.
—— Racial crossing and cultural efflorescence, I, 82.
MURRAY, J. M., Hybrid larch, I, 114.
Music Testing, common sense in, by Dr. B. Semeonoff, III, 447.

NADEL, Dr. S. F., New field experiments on racial psychology, III, 447.
Narcissus, organisation of the nucleolus in, by S. M. Sikka, I, 113.
Narcotics and tissue respiration, by Dr. J. H. Quastel, II, 216.
National atlas, report, II, 361.
NEILL, R. M., Food relations of trout, I, 48.
Neutron generator for biological research, by Dr. L. H. Gray and Dr. J. Read, II, 192.
New lamps for old, by Dr. H. W. Melville, II, 220.
NEWBERRY, Prof. P. E., The crane dance, I, 81.
NEWTON, H. W., Solar phenomena and terrestrial magnetism, II, 199.
Non-linear distortion in iron testing, by Dr. J. Greig and E. Franklin, II, 287.
Norman Lockyer Lecture, 1938, by Dr. H. Spencer Jones, III, 450; 1940, by Prof. W. L. Bragg, IV, 470.
Nursery problems, sowing, weed control and some other, by J. A. B. Macdonald, I, 115.
Nutrition and physique, discussion, I, 79.

OAKLEY, C. A., Education in industry, IV, 480.
OCHOA, Dr. S., Carbon dioxide evolution and cocarboxylase, II, 216.
Ocular muscles, double function of the, by Dr. F. W. Edridge-Green, III, 422.
O'DELL, A. C., Geographical background of Scottish sea-borne trade since the Union, II, 275.
Officers and Council, personnel, *at beginning of each part.*
Office staff reduction, III, 380.
Old Red Sandstone and the Carboniferous, boundary between, discussion, II, 256.
Ordnance Survey, new programme, by Brig. A. B. Clough, II, 272.
ORTON, Prof. J. H., and J. W. JONES, Spawning and post-spawning phase in male salmon parr and smolts, I, 48.
Ostracod zones in the Wealden and Purbeck beds, by F. W. Anderson, II, 259.
OWEN, A. D. K., Finance of Scottish government, III, 395.
OWEN, J. B. B., Stressing of rotating-blade aerofoils, II, 287.

PAGET, Sir R., Sign language and the education of deaf mutes, I, 79.
Pain, discussion on problem of, III, 419.
Palm oil industry, by Prof. T. M. Knox, II, 273.
PARSONS, C. W., Embryology of Hoatzin, I, 48.
PARSONS, H. L., Chemistry in processing of jute, II, 321.
Parthenogenesis, discussion, I, 45.
Parthenogenesis, recent researches in experimental, by Prof. A. D. Peacock, I, 47.
PATERSON, Principal W. G. R., Sprouted fodder in cattle feeding, II, 311.
PEACOCK, Prof. A. D., Recent researches in experimental parthenogenesis, I, 47.
PEIERLS, Prof. R., Mechanics in the University, II, 197.
Perspectives in Evolution, by Prof. J. Ritchie, I, 29
PETERS, Prof. R. A., Tissue respiration, II, 214.
PHILP, Dr. H. L., Experimental approach to psychology of frustration, III, 449.
Physical chemistry, discussion on new technique, in, II, 217.
Physical fitness, assessment of, by Prof. D. Burns, III, 399.

Physical fitness, discussion on, III, 421.
Photochemistry, by Dr. H. W. Melville, II, 218.
Pinaceae, further observations on pollination in, by Prof. J. Doyle, I, 112.
Plankton in North Sea, by C. E. Lucas, I, 45.
Plant structure, interpretation of, by Prof. D. Thoday, I, 84.
Pleolpidium inflatum Butler, a species related to, by Miss G. M. Waterhouse, I, 111.
Plucking as a factor in glacial valley erosion, by W. V. Lewis, II, 276.
Plymouth Laboratory, report, I, 121.
Poetic genius, primitive character of, by Prof. J. Murphy, III, 445.
Polychæte worms, action of hypotonic salines on isolated tissues of, by G. P. Wells and Miss I. C. Ledingham, I, 49.
Polyploidy and geographical distribution, by Prof. A. Vandel, I, 45.
Population density of agricultural type in Britain and the Continent, comparisons of, by Dr. Catherine Snodgrass, II, 276.
Potato production, importance of variety in, by Dr. T. McIntosh, II, 313.
POULTON, Dr. E. P., Local tissue anoxia, II, 217.
POWELL, Dr. R. W., Measurements of thermal conductivity and electrical resistivity at high temperatures, II, 195.
Practice with science, by Sir T. Middleton, II, 288.
Pre-digestion of coarse fodders, by W. Godden, II, 311.
Preparation of scientific papers for communication and publication, by Prof. W. T. Gordon, II, 318.
Presidential addresses : Sir A. C. Seward, I, 11 ; Section A by R. S. Whipple, II, 175 ; B, by Prof. E. K. Rideal, II, 201 ; C, by Prof. H. H. Read, II, 223 ; D, by Prof. J. Ritchie, I, 29 ; E, by A. Stevens, II, 260 ; F, by Prof. H. O. Meredith, III, 381 ; G, by H. E. Wimperis, II, 277 ; H, by Prof. W. E. le Gros Clark, I, 52 ; I, by Prof. D. Burns, III, 399 ; J, by R. J. Bartlett, III, 422 ; K, by Prof. D. Thoday, I, 84 ; L, by Dr. A. P. M. Fleming, IV, 471 ; M, by Sir T. Middleton, II, 288 ; Conference of Delegates, by Prof. H. L. Hawkins, II, 314.
Primates, mental evolution of the, by Dr. R. H. Thouless, I, 81.
Primitive cults in the religion of the New Testament, by Prof. E. O. James, I, 76.
PRINGLE, Dr. J., Cambrian Trilobites in Highland Border rocks near Callander, II, 252.
PRINGLE, Dr. J., and Dr. M. MACGREGOR, Carboniferous rocks at Bridge of Awe, II, 252.
Protoxylem vessels in Heracleum, by G. P. Majumdar, I, 105.
Psychological aptitude of university and training college students, predicting the, by Dr. P. E. Vernon, III, 445.
Psychological aspect of physical education, by Col. R. B. Campbell, III, 421.
Psychological respectability of physical activity, by Dr. W. Stephenson, III, 445.
Psychology of language, by Dr. M. M. Lewis, III, 447.
PURCHON, R. D., *Xylophaga dorsalis*, I, 45.
Pythiomorpha gonapodyides Petersen, life-history of a water-mould allied to, by Miss M. V. Thompson, I, 111.

Quantitative estimates of sensory events, report, II, 331.
QUASTEL, Dr. J. H., Narcotics and tissue respiration, II, 216.

Racial crossing and cultural efflorescence, by Prof. J. Murphy, I, 82.
Racial psychology, new field experiments on, by Dr. S. F. Nadel, III, 447.
RADFORD MATHER, G., death of, IV, 469.
Radford Mather Lecture, by Sir A. Eddington, IV, 470.
RADFORTH, Dr. N. W., Affinities of the fossil schizæaceous ferns, I, 113.
Radioactive indicators, by Prof. S. Sugden, II, 217.
Radioactivity, artificial, and its applications, discussion, II, 191.
Radio effects (in discussion on solar and terrestrial relationships), by Dr. E. V. Appleton, II, 199.
Radley, Dr. W. G., Industrial research, IV, 480.
Raised beaches of the Forth and Tay, discussion, II, 254.
Ranunculus fluitans, uptake of water by cut shoots of, by K. Wilson, I, 106.
RAPER, Prof. H. S., Control of tissue respiration, II, 217.
Rates and taxes, by Prof. H. O. Meredith, III, 381.
RAYNER, G. W., Marking of whales by *Discovery* committee, I, 50.
Reaction of free atoms, by Dr. M. Ritchie, II, 218.
READ, Prof. H. H., Metamorphism and igneous action, II, 223.
Reading conference, 1940, III, 379 ; cancellation, IV, 470.
Research committees, 1939–40, II, 368.
Research in education, report, IV, 533.
Respiratory exchange measured during distance running, by Prof. A. Hemingway and H. R. Noltie, III, 421.
Retinal pigments to coloured light, reaction of, by J. W. Morton, I, 49.
Rhynchospora alba, autecology of, by Miss E. M. Canton, I, 108.
RIDEAL, Prof. E. K., Film reactions as a new approach to biology, II, 201.
RITCHIE, Prof. J., Perspectives in evolution, I, 29.
RITCHIE, Prof. J., and Dr. M. MACGREGOR, Late Glacial remains of reindeer in Glasgow district, II, 254.
RITCHIE, Dr. M., Reaction of free atoms, II, 218.
River pollution, discussion, II, 319.
Roads, design of, by R. G. H. Clements, II, 287.
ROBERTS, E. J., Grass conservation, II, 312.
ROBERTSON, Dr. J. D., Calcium in natural waters, I, 50.
ROBERTSON, Sir R., Water Pollution Research Board, II, 319.
ROSENZWEIG, Dr. S., Need-persistive and ego-defensive reactions to frustration, III, 449.
Royal Commission on Ancient Monuments (Scotland), by A. Graham, I, 78.

Sahara, biology of saline waters in northern, by L. C. Beadle, I, 49.
Salmon and trout, discussion, I, 47.
Salmon, homing instinct of, by P. R. C. Macfarlane, I, 47.
Salmon migrations, by W. J. M. Menzies, I, 47.
Salmon parr and smolts, by Prof. J. H. Orton and J. W. Jones, I, 48.
Salmon parr in Cheshire Dee, by Dr. K. Carpenter, I, 48.
Sanderson, Dr. Ann R., Cytology of parthenogenesis in *Potamopyrgus jenkinsi* Smith, I, 46.
Satterly, Prof. J., Errors in high-temperature measurement, II, 195.
Sawfly parthenogenesis, by Miss M. C. Malcolm, I, 46.
Schizæaceous ferns, affinities of the fossil, by Dr. N. W. Radforth, I, 113.
School-boys, characteristic interests of, by W. H. N. Hotopf, III, 446.
Science and social pioneering, by Dr. I. Bowman, IV, 552.
Scotland, prospects of advancement of knowledge in early history of, by Dr. A. O. Anderson, I, 77.
Scott, Dr. J. F., Physical and human geography of Morvern, Argyll, II, 276.
Scottish government finance, by A. D. K. Owen, III, 395.
Scottish National Forest Park, by Prof. J. Walton, I, 106.
Scottish sea-borne trade since the Union, by A. C. O'Dell, II, 275.
Seed potato growing, discussion, II, 313.
Seed provenance, local races and breeding of forest trees, discussion, I, 109.
Seismological investigations, report, II, 321.
Semeonoff, Dr. B., Common sense in music testing, III, 447.
Sesbania, cytological evolution in, by T. K. T. Jacob, I, 113.
Seward, Sir A. C., Presidential address, I, 11.
Sheep and cattle ranching in Western North America, by G. Bowen, II, 274.
Sheppard, N. F., Anthropology in education, I, 83.
Sign language and the education of deaf-mutes, by Sir R. Paget, I, 79.
Sikka, S. M., Organisation of the nucleolus in Narcissus, I, 113.
Similis-Pulchra Zone in the Pembrokeshire coalfield, by Dr. Emily Dix and W. D. Ware, II, 252.
Simpson, Dr. J. B., Raised beaches of the Forth and Tay, II, 254.
Smail, Principal J. Cameron, Education in industry: part-time education outside the works, IV, 479.
Smith, P., Selection of skilled engineering workers, III, 443.
Smith, W. O. Lester, Education as a preparation for industry, IV, 478.
Snell, K. S., Mechanics in the secondary school, II, 197.
Snodgrass, Dr. Catherine, Comparisons of population density and agricultural type in Britain and the Continent, II, 276.
Socialism, discussion on economics of, III, 397.
Soil fertility in nurseries, by Dr. A. B. Stewart, I, 115.
Solar and terrestrial relationships, discussion, II, 199.
Solar phenomena, by Dr. A. D. Thackeray, II, 199.
Solar phenomena and terrestrial magnetism, by H. W. Newton, II, 199.
Solubility of rocks, by E. H. Davison, II, 258.
South Africa, Recent discoveries bearing on human history in, by Prof. R. Dart, I, 81.
Special Areas in Scotland, by Rt. Hon. Lord N. Douglas-Hamilton, III, 396.
Spens Report, discussion on, IV, 481.
Spiritual journeys of the seer, by Mrs. N. K. Chadwick, I, 78.
Sprouted fodder in cattle feeding, by Principal W. G. R. Paterson, II, 311.
Stars, discussion on surface temperatures of, II, 197.
Stemphylium, physiology of a new species of, by J. Carrick, I, 112.
Stephenson, Dr. W., Psychological respectability of physical activity, III, 445.
Stereochemistry of intramolecular change, by Dr. A. K. Mills, II, 221.
Stevens, A., Presidential Address to Section E, II, 260.
Stevens, Dr. T. S., General type of intramolecular rearrangement, II, 222.
Stewart, Dr. A. B., Soil fertility in nurseries, I, 115.
Stigeoclonium, zoospore formation in a species of, by Dr. M. A. P. Madge, I, 110.
Stockdale, Sir F., Application of economic botany in the tropics, I, 109.
Story, F., Sudeten larch, I, 114.
Stressing of rotating-blade aerofoils, by J. B. B. Owen, II, 287.
Sugden, Prof. S., Radioactive indicators, II, 217.
Sweden, development of highways in, by Dr. N. Friberg, II, 273.
Sylvester, Miss D., Geography of Domesday Cheshire, II, 275.

Tarrant, Dr. G. P., Mechanics in the Scottish school, II, 196.
Taxonomy, experimental; specific and infraspecific categories, by Dr. J. W. Gregor, I, 107.
Tay Valley, population changes since 1755, by S. G. E. Lythe, II, 275.
Television outside-broadcasts, by A. B. Howe, II, 191.
Thackeray, Dr. A. D., Solar phenomena, II, 199.
Theorell, Dr. H., Flavoproteins, II, 214.
Thermal conductivities of rocks, report, II, 330.
Thoday, Prof. D., Interpretation of plant structure, I, 84.
Thompson, Miss M. V., Life-history of a watermould allied to *Pythiomorpha gonapodyides* Petersen, I, 111.
Thompson, Sir D'Arcy, Mechanics of the bird's skeleton, I, 48.
Thomson, T., seed provenance, etc., of forest trees, I, 109.

THOULESS, Dr. R. H., Mental evolution of the Primates, I, 81.
Tibet, wooden teapots from Kongbo province, by R. Kerr, I, 82.
TIFFENEAU, Prof. M., Aptitudes migratrices et capacités affinitaires des radicaux non-saturés dans les transpositions moléculaires, II, 220.
Tissue respiration, discussion, II, 214.
TODD, T. F., Intra-thecal alcoholisation, III, 420.
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Town development in Scotland, by K. H. Huggins, II, 271.
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Trans-Atlantic air service, by Major R. H. Mayo, II, 287.
Transplant experiments, report, I, 127.
Trout, food relations of, by R. M. Neill, I, 48.
TURNBULL, Prof. H. W., Matrix theory in its geometrical aspect, II, 196.
Tweeddale and the Borders (Film), by Miss I. M. Hayward, I, 113.

Uganda, archæology of, by E. J. Wayland and Prof. C. Van Riet Lowe, I, 78.
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Urban concentration, economic aspects of, by Dr. T. Adams, III, 394.
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VEGARD, Prof. L., Auroral phenomena and the physics of upper atmosphere, II, 200.
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Visceral afferent fibres, by Prof. B. A. McSwiney and Dr. B. M. Unkauf, III, 419.
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Vocational adviser's case book, by Dr. N. A. B. Wilson, III, 444.
Voith-Schneider system of propulsion, by Capt. E. C. Goldsworthy, II, 287.

WAGER, L., Trend of fractional crystallization of basalt magma, II, 259.
WALTON, Prof. J., Scottish National Forest Park, I, 106.
WANNOP, A. R., Young farmers' clubs, II, 311.
WARD, W. H., Flow of liquids through beds of granular solids, II, 287.
WARING, H., Chromatic behaviour of fresh water eel, I, 49.
Warwickshire coalfield, sections in, by Dr. Emily Dix, II, 253.
WATERHOUSE, Miss G. M., A species related to *Pleolpidium inflatum* Butler, I, 111.
WATERSTON, Prof. D., Problem of pain, III, 419.
WATSON, Dr. S. J., Grass conservation, II, 312.
WAYLAND, E. J., and Prof. C. VAN RIET LOWE, Archæology of Uganda, I, 78.
WEDDERSPOON, T. A., Seed potato growing, II, 313
WELLS, G. P., and Miss I. C. LEDINGHAM, Action of hypotonic salines on isolated tissues of polychæte worms, I, 49.
WENSLEY, A. J., Localisation and concentration of industry, III, 394.
Western Isles through the mists of ages, by Sir A. C. Seward, I, 11.
WESTOLL, Dr. T. S., Boundary between Old Red Sandstone and the Carboniferous, II, 258.
—— Fossil fishes of the 'Caledonian' Old Red Sandstone, II, 256.
Whales, marking of, by *Discovery* committee, by G. W. Rayner, I, 50.
WHIPPLE, R. S., Instruments in science and industry, II, 175.
Wicken Fen, report, I, 121.
WILSON, Dr. D. C., Nutrition and physique, I, 80.
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WIMPERIS, H. E., Future of flying, II, 277.
WOOLLEY, Dr. R. v. d. R., Astrophysical theory, II, 198.
WORTHINGTON, Dr. E. B., Research on freshwaters, I, 50.
WYNNE-JONES, Prof. W. F. K., Isotopes as atom indicators for reactions in solution, II, 218.

Xylophaga dorsalis, by R. D. Purchon, I, 45.

Young farmers' clubs, by A. R. Wannop, II, 311.

ZEERLEDER, Prof. A. von, Light alloys of aluminium, II, 219.
Zoological record, report, I, 116.
ZUCKERMAN, Dr. S., Evolution of the human brain, I, 81.
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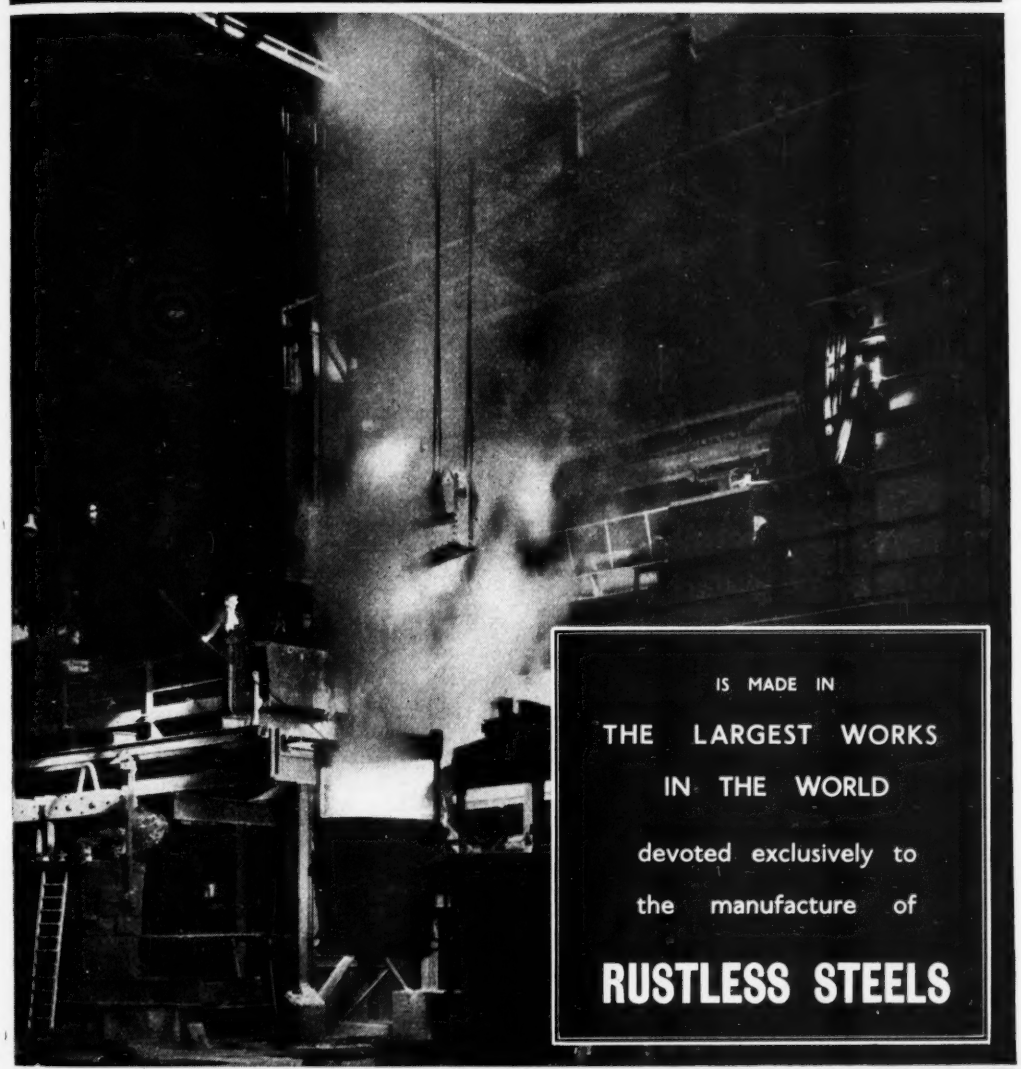

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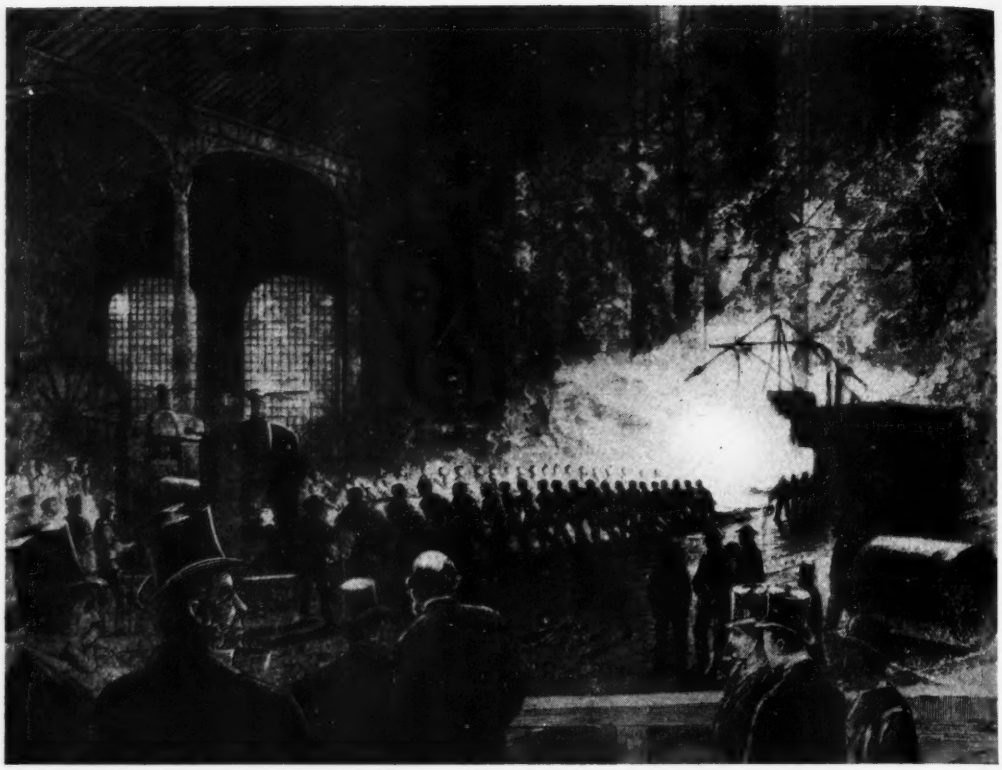

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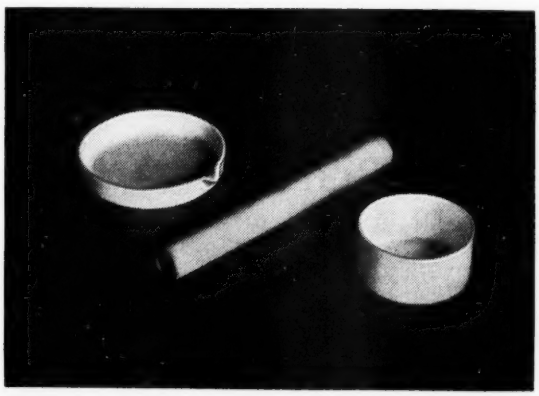

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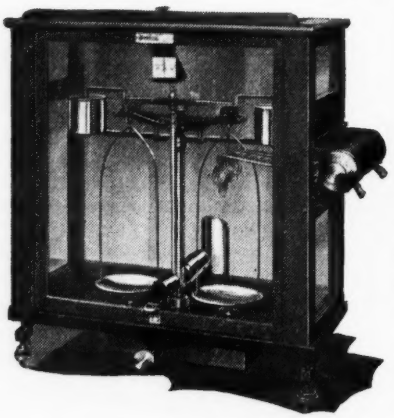

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